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Department of Agriculture, Bombay.

ANNUAL REPORT

ON THE

EXPERIMENTAL WORK

OF THE

NADIAD AGRICULTURAL STATION
(Kaira District, Gujarát)

FOR THE YEAR

1906-1907

BY

F. FLETCHER, M.A., B.Sc., ETC.,
Deputy Director of Agriculture.

BOMBAY
PRINTED AT THE GOVERNMENT CENTRAL PRESS
1907

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Vernacular names of crops, &c., mentioned in the report and their Botanical and English equivalents.

Botanical.	English.	Vernacular.
Oryza sativa	Rice	Dángar (Sutarsál, Kamod).
Pennisetum typhoideum	Bulrush millet	Bájri, Bájro.
Panicum scrobiculatum	Kodra millet	Kodra.
Hordeum vulgare	Barley	Jao.
Andropogon sorghum var. vulgare	Great millet	Jowár.
Do. cernuum	Do.	Sundhia.
Elusine coracana	Muma millet	Bávto.
Triticum vulgare	Wheat	Ghau.
Pulses.		
Cajanus indicus	Pigeon pea	Tuver.
Cicer arietinum	Gram	Chana.
Phaseolus mungo	Green gram	Mag.
Phaseolus radiatus	Black gram	Adad.
Dolichos lablab	Indian bean	Vál.
Cyamopsis psoralioides	Field vetch	Guvár.
Glycine hispida	Soy beans.	
Oil-seeds.		
Sesamum indicus	Sesamum	Tal.
Ricinus communis	Castors	Diveli.
Arachis hypogea	Groundnut	Bhoising.
Eruca sativa	......	Jámbho.
Fibre Plants.		
Gossypium herbaceum	Gujarát and Dhárwár cotton	Broach, Ghogári, Kumta, &c., kapás.
Do. neglectum	Do.	Rozi kapás.
Hibiscus cannabinus	Brown hemp	Sheria, Ambádi.
Crotolaria juncea	Bombay hemp	San.
Condiments.		
Cuminum cyminum	Cumine	Jiru.
Capsicum frutescens	Chillies	Marcha.
Pimpinella anisum	Anise	Variáli.
Allium cepa	Onions	Kánda.
Brassica juncea	Mustard	Rái.
Sugar.		
Sachharum officinarum	Sugarcane	Sherdi.
Narcotics.		
Nicotiana tabacum	Tobacco	Tambákhu.
Vegetables.		
Solanum melongena	Brinjal	Vengan.
Solanum tuberosum	Potato	Batáta.
Momordica charantia	Bitter gourd	Káreli.

One guntha = $\frac{1}{40}$ of an acre.

B 992—*a*

1906/07-10/11

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THE NADIA'D AGRICULTURAL STATION, 1906-07.

Established—1903 ; *North Latitude*—22° 44′ ; *East Longitude*—73° 0′ ; *Elevation*—approximately sea level ; *Soil*—alluvial loam (Var. Gorádu) ; *Average rainfall*—34′ 64″ ; *Temperature*—maximum 114° in May, minimum 43° in January.

Area—44 acres.

Superintendent—Mr. Dattátraya Hari Tagáre.

Season.

	April.	May.	June.	July.	August.	September.	October.	November.	December.	January.	February.	March.	Total.
Rainfall— (1906-07)	0′ 0″	0′ 0″	6′ 35″	11′ 15″	12′ 25″	0′ 12″	0′ 0″	0′ 0″	0′ 0″	0′ 0″	0′ 75″	0′ 2″	30′ 67″
Average	0′ 1″	0′ 15″	4′ 49″	11′ 8″	9′ 64″	5′ 16″	0′ 44″	0′ 37″	0′ 5″	0′ 3″	0′ 16″	0′ 6″	34′ 64″
Temperature (1906-07)— Mean maximum ...	105°	103°	97°	93°	91°	89°	96°	94°	90°	88°	88°	98°	
Mean minimum ...	74°	83°	83°	81°	79°	78°	72°	62°	56°	51°	55°	64°	

2. The monsoon commenced early. The first shower of rain came on the 16th June and by the 29th June there was sufficient rain to sow all crops. Since the famine this was the first year in which sowing could be commenced in June. The rain was quite favourable for germination. During the first fortnight of July, there was slight rain and cultivators were very anxious to have heavy rains for transplanting rice. Seedlings of rice were rather overgrown as they could not be planted till 25th of July. Heavy rainfall on the 24th and 25th of July damaged the young cotton plants to some extent. There was only an inch of rain during the first fortnight of August. Bájri, Tal, Tuver, etc., crops grew vigorously. Bájri grew very vigorously and promised a good yield. About the middle of August, Kodra plants began to wither in some places. On the 26th August there was a heavy rainfall and the fine crop of Bájri was badly laid. The flowers were washed off and the subsequent constant rain for a week caused the ears to rot. This season there was Bájri smut very prevalent in the district and naturally the farm suffered along with the rest, with the result that the Bájri crop was a total failure. Some of the cultivators did not even take the trouble to harvest the crop as it consisted of nothing but inferior Bájri straw.

Owing to the favourable time of transplanting even the small seedlings of tobacco were planted; but on account of constant rain, they rotted and there were several blanks in the fields. The scarcity of seedlings was much felt this year and many a cultivator made a profitable business in selling extra seedlings. Kodra, barley, rice, etc., were much benefited by this rain. In the month of September there were only 3·65 inches of rain. On the whole it may be said that the season was a favourable one for crops in general when compared with the past few years.

Manurial Experiments.

3. *Irrigated Tobacco.*—The object was—

(1) to compare the effects of the following manures:

- (*a*) Farmyard manure,
- (*b*) Castor-cake,
- (*c*) Farmyard manure + castor-cake,
- (*d*) Farmyard manure + nitre,
- (*e*) Farmyard manure + sodium nitrate,
- (*f*) Farmyard manure + ammonium sulphate,
- (*g*) San ploughed in as green manure;

(2) to compare tobacco grown in rotation with tobacco grown continuously;

(3) to compare the effects of ordinary and deep ploughing on tobacco.

By deep ploughing is meant ploughing with an English Turnwrest plough followed by a country wooden plough in the same furrow.

The following table shows the details of cultivation of the several tobacco plots:—

Plot No.	Area.	Crop.	Tillage.	Manure.			Continuous or in rotation.	Crops grown in rotation.	Irrigated or not.	Results per acre.			Remarks.
				Kind.	Quantity per acre.	Date of application of manure.				Outturn of cured leaves.	Value of produce.	Cost of cultivation.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Gunthas.									Lbs.	Rs. a. p.	Rs. a. p.	
1	10	Tobacco .	Ordinary ...	Farmyard manure .	15 tons ...	June ...	Continuous...	......	Irrigated.	1,780	142 6 4	80 13 0	
12	10	Do. ...	Deep ...	Do. ...	Do. ...	Do. ...	Do. ...	......	Do. ...	1,760	140 12 8	85 11 0	
2	10	Do. ...	Ordinary ...	Castor-cake ...	2,000 lbs. ...	October ...	Do. ...	......	Do. ...	1,504	120 5 0	92 11 4	Damaged by wilt.
3	10	Do. ...	Deep ...	Do. ...	Do. ...	Do. ...	Do. ...	......	Do. ...	1,423	114 2 0	92 4 0	Do.
3	10	Do. ...	Ordinary	Farmyard manure . + Castor-cake ...	10 tons ... + 600 lbs. ...	June ... October ...	Do. ...	......	Do. ...	1,992	159 5 8	81 6 0	
14	10	Do. ...	Deep ...	Do. ...	Do. ...	Do. ...	Do. ...	......	Do. ...	1,984	159 3 4	84 6 4	
4	10	Do. ...	Ordinary	Farmyard manure . + Nitre ...	10 tons ... 112 lbs. ...	June ... October ...	Do. ...	......	Do. ...	1,240	99 3 0	81 9 4	Damaged by wilt.
15	10	Do. ...	Deep ...	Do. ...	Do. ...	Do. ...	Do. ...	......	Do. ...	1,564	125 2 0	84 13 8	Do.
5	10	Do. ...	Ordinary	Farmyard manure . + Sodium nitrate ...	10 tons ... 112 lbs. ...	June ... October ...	Do. ...	......	Do. ...	1,224	97 14 8	82 3 8	Do.
16	10	Do. ...	Deep ..	Do. ...	Do. ...	Do. ...	Do. ...	......	Do. ...	1,608	128 10 0	84 15 8	
23	10	Do. ...	Ordinary ...	Green manure of San.	San was sown in July and ploughed in August.		Do. ...	......	Do. ...	1,824	145 14 8	60 11 8	
34	10	Do. ...	Deep ...	Do. ...	Do. ...	Do. ...	Do. ...	......	Do. ...	2,172	173 12 0	64 6 8	
25	10	Do. ...	Ordinary ...	Do. ...	Do. ...	Do. ...	In rotation.	1st year tobacco... 2nd year Kodra...	Do. ...	2,092	167 5 8	59 5 0	
36	10	Do. ...	Deep ...	Do. ...	Do. ...	Do. ...	Do. ...	Do. ...	Do. ...	1,948	155 13 4	66 11 0	
27	10	Do. ...	Ordinary ...	Farmyard manure .	15 tons ...	June ...	Do. ...	Do. ...	Do. ...	1,512	120 15 4	84 1 8	Damaged by wilt.
38	10	Do. ...	Deep ...	Do. ...	Do. ...	Do. ...	Do. ...	Do. ...	Do. ...	1,780	158 6 4	85 10 8	
141	12	Do. ...	Ordinary	Farmyard manure . + Ammonium sulphate.	10 tons ... 112 lbs. ...	June ... October ...	Continuous.	......	Do. ...	1,490	119 3 2	77 14 10	Damaged by wilt.

Owing to the saltish irrigation water the cured leaves were not bright in colour. The nitre and sodium nitrate plots were severely damaged by wilt disease. Green manure (San) has produced a better yield. The cured leaves are thinner and rather whitish in appearance. This green manure makes the soil very soft and is likely to encourage the growth of Vacumba (Orobanche Nicotiana). No conclusions can be drawn as some of the plots are damaged by wilt disease.

4. *Rice.*—The object was—

(1) to compare farmyard manure with nitre,
(2) to compare rice manured and irrigated with rice manured but not irrigated,
(3) to compare rice grown unmanured and unirrigated with rice grown manured but not irrigated.

The variety of rice grown was Sutarsál.

The results are as under :—

Plot No.	Area.	Crop.	Tillage.	Manure.			Irrigation.	Yield per acre.		Value of produce.	Cost of cultivation.
				Kind.	Quantity per acre.	Time of application.		Grain.	Straw.		
	Gunthas.							Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
90	6	Rice ...	Ordinary	F. Y. M. ... + Nitre ...	7½ tons... 80 lbs. ...	June ... August...	Nil ...	1,266	2,046	46 6 2	57 8 6
91	6	Do. ...	Do. ...	Nil ...	Nil ...	...	Nil ...	1,200	2,146	44 10 5	36 4 0
93	5·5	Do. ...	Do. ...	F. Y. M. ...	7½ tons ...	June ...	Nil ...	1,127	2,051	42 0 8	50 10 11
94	6	Do. ...	Do.	F. Y. M. ... + Nitre ...	7½ tons... 80 lbs. ...	June ... August...	Irrigated.	1,933	2,413	68 7 6	64 6 0
95	8·5	Do. ...	Do. .	F. Y. M. ...	7½ tons...	June ...	Do. ...	1,529	1,915	54 1 4	58 8 6

The crops are all below the average; owing to the sandy nature of the soil these rice beds cannot at present hold sufficient moisture. Nitre has apparently produced a considerable increase in the irrigated rice. On the irrigated plots the addition of nitre (worth Rs. 8) to farmyard manure increased the value of the crop by some Rs. 14.

Rotation Series Experiments.

5. *Series I.*—The object was to see the effects of ordinary and deep ploughing on the following rotation and to compare it with others :—

1st year—(*a*) Bájri.
(*b*) Jiru and Káreli.
2nd year—Sundhia.
3rd year—Kodra and mixture.

The following statement shows the details of plots and cultivation in this series :—

Plot No.	Area.	Crop.	Tillage.	Manure.			In rotation or continuous.	Irrigated or not.
				Kind.	Quantity per acre.	Time of application.		
	Gunthas							
8	10	(*a*) Bájri ...	……	Nil ...	Nil ...	...	In rotation ...	Nil.
		(*b*) Jiru ... + Kárcli ...	Ordinary ...	F. Y. M..	10 tons ...	November	……	Irrigated.
19	10	Do. ...	Deep ...	Do. ...	Do. ...	Do. ...	In rotation ...	Do.
6	10	Sundhia ...	Ordinary ...	Nil ...	Nil ...	...	Do. ...	Nil.
17	10	Do. ...	Deep ...	Nil ...	Nil ...	...	Do. ...	Nil.
7	10	Kodra and mixture.	Ordinary ...	Nil ...	Nil ...	...	Do. ...	Nil.
18	10	Do. ...	Deep ...	Nil ...	Nil ...	...	Do. ...	Nil.

The results of Bájri and Jiru are as under :—

Crop.	Plot No. 8 ordinarily ploughed.				Plot No. 19 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Bájri	540	4,536	22 15 4	19 13 8	624	4,800	23 1 4	22 5 8
Jiru	476	...	54 9 4	58 13 8	588	...	67 6 8	63 1 8
+ Káreli			Not finished.					

The yield of Bájri is below the average owing to heavy rains at the end of August.

The Jiru was a promising crop but was damaged seriously by rain in February. The quality of the produce was inferior.

The results of Sundhia are as under :—

Crop.	Plot No. 6 ordinarily ploughed.				Plot No. 17 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre		Value of produce.	Cost of cultivation.
	Grain	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Sundhia	128	5,172	25 6 0	19 9 4	212	5,780	31 4 8	23 9 0

The results of the Kodra mixture are as under :—

Crop.	Plot No. 7 ordinarily ploughed.				Plot No. 18 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Kodra	252	548	4 15 4	17 8 0	188	548	3 12 4	20 0 0
Tal	308	...	26 0 0		372	...	31 6 0	
Sheria	148	Fibre 80	7 7 4		96	Fibre 44	4 7 0	
Tuver	556	668	20 7 0		416	500	15 4 8	
			58 13 8				54 14 0	

The crop of Tal was very good.

6. *Series II.*—The object was to see the effects of ordinary and deep ploughing on the following rotation and to compare it with others :—

1st year	Bájri, Math and Tuver.
2nd year	Kodra and mixture.
3rd year	Sundhia.

The following statement shows the details of plots and cultivation under this series :—

Plot No.	Area.	Crop.	Tillage.	Manure.			In rotation or continuous.	Irrigated or not.
				Kind.	Quantity per acre.	Time of application.		
	Gunthas.							
11	10	Bájri, Math and Tuver.	Ordinary ...	F. Y. M. ...	5 tons ...	June ...	In rotation.	Nil.
22	10	Do. ...	Deep ..	Do. ...	Do. ...	Do. ...	Do. ...	Nil.
9	10	Kodra and mixture.	Ordinary ...	Nil ...	Nil ...	......	Do. ...	Nil.
20	10	Do. ...	Deep ...	Nil ...	Nil ...	......	Do. ...	Nil.
10	10	Sundhia ...	Ordinary ...	Nil ...	Nil ...	......	Do. ...	Nil.
21	10	Do. ...	Deep ...	Nil ...	Nil ..	......	Do. ...	Nil.

The results of Bájri, Math and Tuver are as under :—

Crop.	Plot No. 11 ordinarily ploughed.				Plot No. 22 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Bájri	228	2,284	12 3 4	32 1 4	272	2,272	13 11 0	34 9 4
Math	212	1,696	8 11 0		180	1,264	7 0 4	
Tuver	308	344	11 4 4		408	364	13 5 0	
			32 2 8				34 0 4	

The yield of Bájri is much below the average. There is not much difference between ordinarily ploughed and deeply ploughed plots.

The results of Sundhia are as under :—

Crop.	Plot No. 10 ordinarily ploughed.				Plot No. 21 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Sundhia	388	4,452	32 14 0	21 8 0	412	4,432	33 6 4	24 4 8

The results of Kodra are as under :—

Crop.	Plot No. 9 ordinarily ploughed.				Plot No 20 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Kodra	432	368	8 6 8	19 6 8	528	1,100	10 4 4	21 14 8
Tal	56	...	4 11 8		120	...	10 2 0	
		Fibre				Fibre		
Sheria	132	72	6 11 0		140	76	7 1 4	
Tuver	432	400	15 12 4		312	352	11 7 0	
			35 9 8				38 14 8	

There is no difference between the two plots ; the value of produce is similar.

7. *Series III.*—The object was to see the effects of deep and ordinary ploughing on the following rotation and to compare it with others :—

(*a*) 1st year ... ... Tobacco manured with farmyard manure.
2nd year ... ... Kodra mixture.

(*b*) 1st year ... ... Tobacco manured with green manure.
2nd year ... ... Kodra mixture.

The details of plots and cultivation in the series are as under :—

Plot No.	Area in gunthas.	Crop.	Tillage.	Manure.			In rotation or continuous.	Irrigated or not.
				Kind.	Quantity per acre.	Time of application.		
25	10	Tobacco ...	Ordinary ...	Green	manure (of	San) ...	In rotation.	Irrigated
36	10	Do. ...	Deep ...		Do.		Do. ..	Do.
24	10	Kodra mixture	Ordinary ...	Nil ...	Nil ...	......	Do. ...	Nil.
35	10	Do. ...	Deep ...	Nil ...	Nil ..	......	Do. ...	Nil.
27	10	Tobacco ...	Ordinary ...	F. Y. M. ...	15 tons ...	June ...	Do ...	Irrigated.
38	10	Do. ...	Deep ...	Do. ...	Do. ...	Do. ..	Do. ...	Do.
26	10	Kodra mixture .	Ordinary ...	Nil ...	Nil ...	......	Do. ...	Nil.
37	10	Do. ...	Deep ...	Nil ...	Nil ...	......	Do. ...	Nil.

The results of tobacco have already been noted (page 3).

The results of Kodra grown in rotation with tobacco manured with green manure are as under :—

Crop.	Plot No. 24 ordinarily ploughed.				Plot No. 35 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Kodra	1,416	3,153	27 8 8	20 6 0	1,304	2,941	25 11 2	22 14 0
Tal	60	...	5 1 0		112	...	9 7 4	
Sheria	268	Fibre 160	14 4 4		152	Fibre 84	7 12 0	
Tuver	324	360	11 13 4		432	402	15 13 4	
			58 11 4				58 11 10	

Yield of both the plots is similar.

The results of Kodra grown in rotation with tobacco manured with farmyard manure are as under :—

Crop.	Plot No. 26 ordinarily ploughed.				Plot No. 37 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Kodra	1,208	3,372	24 6 4	20 12 0	1,272	3,512	26 9 7	23 4 0
Tal	228	...	19 4 0		268	...	17 8 8	
Sheria	248	Fibre 120	11 13 0		9	Fibre 44	4 7 0	
Tuver	752	940	27 12 0		630	688	22 4 0	
			83 3 4				70 13 3	

If the above four plots be compared, it seems that Kodra after a crop manured with farmyard manure grows better than after a crop manured with green manure.

8. *Series IV.*—The object was to see the effects of deep and ordinary ploughing on the following rotation and compare it with others :—

1st year	Variáli.
2nd year	(*a*) Bájri. (*b*) Onions.
3rd year	Kodra and mixture.

The following table gives the details of plots and cultivation in this series :—

Plot No.	Area in gunthas.	Crop.	Tillage.	Manure.			In rotation or continuous.	Irrigated or not.
				Kind.	Quantity per acre.	Time of application.		
30	10	Variáli ...	Ordinary ...	F. Y. M. ...	12⅓ tons	June ...	In rotation.	Irrigated.
41	10	Do. ...	Deep ...	Do. ...	Do. ...	Do. ...	Do. ...	Do.
28	10	(a) Bájri ...	Ordinary ...	Nil ...	Nil ...	......	Do. ...	Nil.
		(b) Onions ...	Do. ...	Castor-cake.	800 lbs. ...	January ...	Do. ...	Irrigated.
39	10	Do. ...	Deep ...	Do. ...	Do. ...	Do. ...	Do. ...	Do.
29	10	Kodra mixture	Ordinary ...	Nil ...	Nil ...	......	Do. ...	Nil.
40	10	Do. ...	Deep ...	Nil ...	Nil ...	......	Do. ...	Nil.

The results of Variáli are as under :—

Crop.	Plot No. 30 ordinarily ploughed.				Plot No. 41 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.		Rs. a. p.	Rs. a. p.	Lbs.		Rs. a. p	Rs. a. p.
Variáli	1,744	...	140 5 8	101 8 8	2,194	...	176 9 4	104 0 8

The results of Bájri and onions are as under :—

Crop.	Plot No. 8 ordinarily ploughed.				Plot No. 39 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Fodder.			Grain.	Fodder.		
	Lbs.	Lbs.	Rs. a. p	Rs. a. p.	Lbs.	Lbs	Rs. a. p.	Rs. a. p.
A. Bájri	576	6,192	29 5 8	20 13 0	624	5,792	24 0 0	23 5 0
B. Onions	19,260	...	210 10 4	112 4 4	19,370	...	211 13 8	117 4 4

Bájri was a very promising crop but was damaged by late rains. Both the plots of onions are similar in yield.

The results of Kodra are as under :—

Crop.	Plot No. 29 ordinarily ploughed.				Plot No. 40 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Fodder.			Grain.	Fodder		
	Lbs.	Lbs.	Rs. a. p	Rs. a. p	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Kodra	460	952	9 0 0	18 4 0	456	948	8 15 0	20 12 0
Tal	288	...	24 4 8		244	...	20 9 4	
		Fibre				Fibre		
Sheria	128	68	6 6 4		144	68	6 12 4	
Tuver	612	702	22 10 8		552	628	20 1 8	
			62 5 8				56 6 4	

9. *Series V.*—The object was to see the effects of deep and ordinary ploughing on the following rotation and to compare it with others :—

1st year ... ... Bájri and mixture.
2nd year ... ... Kodra and mixture.
3rd year ... ... Bávto, Vál and castors.

The following table shows the details of plots and cultivation in this series :—

Plot No.	Area in gunthas.	Crop.	Tillage.	Manure. Kind	Manure. Quantities per acre.	Manure. Time of application.	In rotation or continuous.	Irrigated or not.
33	10	Bájri and mixture .	Ordinary ...	F. Y. M.	5 tons ...	June ...	In rotation ...	*Nil.*
44	10	Do. ...	Deep ...	Do. ...	Do. ...	Do. ...	Do. ...	*Nil.*
31	10	Kodra and mixture.	Ordinary ...	*Nil* ...	*Nil* ...	...	Do. ...	*Nil.*
42	10	Do. ...	Deep ...	*Nil* ...	*Nil* ...	...	Do. ...	*Nil.*
32	10	Bávto, castors and Vál.	Ordinary ..	*Nil* ...	*Nil* ...	...	Do. ...	*Nil.*
43	10	Do. ...	Deep ...	*Nil* ...	*Nil* ...	...	Do. ...	*Nil.*

The results of Bájri mixture are as under :—

Crop.	Plot No. 32 ordinarily ploughed. Yield per acre. Grain.	Yield per acre. Fodder.	Value of produce.	Cost of cultivation.	Plot No. 43 deeply ploughed. Yield per acre. Grain.	Yield per acre. Straw.	Value of produce.	Cost of cultivation.
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a p.	Rs. a. p.
Bájri	304	2,532	15 10 0	36 6 8	348	2,680	17 8 4	38 12 8
Math	44	296	1 11 0		40	288	1 9 4	
Mag	360	2,588	16 6 8		280	1,816	12 6 0	
Tuver	308	428	11 7 0		184	216	6 12 8	
			45 2 8				38 4 4	

The results of Kodra mixture are as under :—

Crop.	Plot No. 31 ordinarily ploughed. Yield per acre. Grain.	Yield per acre. Fodder.	Value of produce.	Cost of cultivation.	Plot No. 42 deeply ploughed. Yield per acre. Grain.	Yield per acre. Fodder.	Value of produce.	Cost of cultivation.
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Kodra	1,123	2,084	22 2 4	18 12 0	1,076	2,040	21 2 8	21 4 0
Tal	48	... Fibre	4 0 8		244	... Fibre	20 9 4	
Sheria	196	84	8 12 4		276	100	11 7 4	
Tuver	232	260	8 7 8		272	300	10 15 4	
			43 7 0				63 2 8	

The results of Bávto, castors and Vál are as under :—

Crop.	Plot No. 32 ordinarily ploughed.				Plot No. 43 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Fodder.			Grain.	Fodder.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Bávto	1,580	2,843	53 15 0	31 14 8	1,333	2,556	47 5 4	34 6 8
Castors	292	...	18 4 0		268	...	16 12 0	
Vál green pods ...	768	...	10 10 0		712	...	9 14 0	
Do. Grain ...	104	...	3 4 0		84	...	2 10 0	
			86 1 0				76 9 4	

10. *Series VI.*—The object was to see the effects of ordinary and deep ploughing on the following rotation and to compare it with others :—

1st year	... ...	Sugarcane.
2nd year	... ...	Chillies.
3rd year	... ...	Bájri.

The following statement shows the details of plots, crops, cultivation, etc., in this series :—

Plot No.	Area in gunthas.	Crop.	Tillage.	Manure.			In rotation or continuous.	Irrigated or not.
				Kind.	Quantities per acre.	Time of application.		
45A	5	Sugarcane.	Ordinary ...	Castor-cake..	6,000 lbs.	May-July ...	In rotation ...	Irrigated.
53A	5	Do. ..	Deep ...	Do. ..	Do. ...	Do. ...	Do. ...	Do.
45B	5	Do. ..	Ordinary.	Castor-cake.. + Ammonium sulphate.	4,000 lbs. 400 lbs.	Do. ...	Do. ...	Do.
53B	5	Do. ..	Deep ...	Do. ...	Do. ...	Do. ...	Do. ...	Do.
46A	5	Do. ...	Ordinary	Castor-cake... + Nitre ..	4,000 lbs. 400 lbs.	Do. ...	Do. ...	Do.
54A	5	Do. ...	Deep ...	Do. ...	Do. ...	Do. ...	Do. ...	Do.
46B	5	Do. ...	Ordinary	Castor-cake.. + Nitre .. + Ammonium sulphate.	4,000 lbs 200 lbs. 200 lb.	Do. ...	Do. ...	Do.
54B	5	Do. ...	Deep ...	Do. ...	Do. ...	Do. ...	Do. ...	Do.
49	10	Chillies ..	Ordinary...	Castor-cake..	3,000 lb.	Do. ...	Do. ...	Do.
57	10	Do. ..	Deep ...	Do. ...	Do. ...	Do. ...	Do. ...	Do.
50	10	Do. ..	Ordinary.	Castor-cake. + Superphosphate.	2,000 lbs. 500 lbs,	Do. ...	Do. ...	Do.
58	10	Do. ..	Deep ...	Do. ...	Do. ...	Do. ...	Do. ...	Do,
47	10	Bájri ..	Ordinary ...	*Nil* ..	*Nil* ...	......	Do. ...	Do.
55	10	Do. ...	Deep ...	*Nil* ..	*Nil* ...	......	Do. ...	Do.
48	10	Do. ...	Ordinary ...	*Nil* ...	*Nil* ...	......	Do. ...	Do.
56	10	Do. ...	Deep ...	*Nil* ...	*Nil* ...	......	Do. ...	Do.

Sugarcane was planted in May but on account of white ants, germination was very poor. It was also attacked by borers afterwards and the crop was ploughed up.

Results of Bájri are as under:—

Crop.	Plot Nos. 47-48 ordinarily ploughed.				Plot Nos. 55-56 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Fodder.			Grain.	Fodder.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Bájri	544	5,508	28 4 2	19 12 4	578	5,972	30 0 10	22 4 4

The crop was damaged by late rains.

The results of chillies are as under:—

Plot No.	Crop.	Tillage.	Manure.	Yield per acre.	Value of produce.	Cost of cultivation.	Remarks.
				Lbs.	Rs. a. p.	Rs. a. p.	
49	Chillies ...	Ordinary ...	Castor-cake ..	752	15 10 8	119 11 0	Totally damaged by white ants.
57	Do. ...	Deep ...	Do. ...	2,636	54 14 8	138 13 4	
50	Do. ...	Ordinary ...	Superphosphate + castor-cake.	1,786	37 3 4	132 14 4	
58	Do. ...	Deep ...	Do. ...	5,138	107 0 8	150 15 4	

The results are very poor.

11. *Series VII.*—The object was to see the effects of deep and ordinary ploughing on the following rotations and to compare it with others:—

1st year	... ...	(*a*) Bájri.
		(*b*) Wheat.
2nd year	... ...	Kodra and mixture

The details of plots, crops, cultivation, etc., are as under:—

Plot No.	Area in gunthas.	Crop.	Tillage.	Manure.			In rotation or continuous.	Irrigated or not.
				Kind.	Quantity per acre.	Time of application.		
52	10	Kodra mixture.	Ordinary ...	*Nil* ...	*Nil* ...	......	In rotation...	*Nil.*
60	10	Do. ...	Deep ...	*Nil* ...	*Nil* ...	......	Do. ...	*Nil.*
51	10	(*a*) Bájri ... (*b*) Wheat ...	Ordinary ..	F. Y. M.. *Nil* ...	10 tons ... *Nil* ...	June ...	Do. ...	*Nil.* Irrigated.
59	10	Do. ...	Deep ...	*Nil* ...	*Nil* ...	June ...	Do. ...	Do.

The results of Kodra mixture are as under :—

Crop.	Plot No. 52 ordinarily ploughed.				Plot No. 60 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Fodder.			Grain.	Fodder.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs a. p.	Rs. a. p.
Kodra	508	1,188	10 0 4	18 13 0	924	2,036	18 10 4	21 5 0
Tal	84	...	7 1 4		60	...	5 1 0	
Sheria	156	Fibre 56	6 7 0		116	Fibre . 56	5 8 0	
Tuver	560	680	20 9 4		441	628	16 8 0	
			44 2 0				45 11 4	

The results of Bájri and wheat are as under :—

Crop.	Plot No. 51 ordinarily ploughed.				Plot No. 59 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Fodder.			Grain.	Fodder.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
A. Bájri ...	748	5,408	34 8 0	42 6 4	576	5,408	29 12 0	44 13 0
B. Wheat ...	932	1,964	35 15 4	60 0 0	1,628	2,256	60 7 4	69 14 0

The yield is below the average.

12. *Series VIII.*—The object was—

(1) to compare the effects of farmyard manure + castor-cake + green manures ;

(2) to compare the effects of deep ploughing ;

(3) to compare the effects of taking 3 crops in a year with those of taking the same crops in 2 years.

The details of plots, crops and treatment are as under :—

Plot No.	Area in gunthas.	Crop.	Tillage.	Manures.			In rotation or continuous.	Irrigated or not.
				Kind.	Quantity per acre.	Time of application.		
61	10	Bájri ...	Ordinary ...	F. Y. M. ...	10 tons...	June ...	Continuous ...	*Nil.*
		Potatoes ...	Do. ...	Castor-cake...	800 lbs. .	December ...	Do. ...	Irrigated.
		Sundhia ...	Do. ...	*Nil* ...	*Nil* ...	*Nil* ...	Do. ...	Do.
71	10	Do. ...	Deep ...	Do. ..	Do. ...	Do. ...	Do. ...	Do.
62	10	Potatoes ...	Ordinary ...	San ...	Green	manure ... August ..	In rotation ...	Do.
		Sundhia ...	Do. ...	*Nil* ...	*Nil* ..	*Nil* ...		
72	10	Do. ..	Deep ...	Do. ...	Do. ...	Do. ...	Do. ...	Do.
64	10	Potatoes ...	Ordinary ...	Castor cake .	800 lbs. .	December ...	In rotation ...	Do.
		Sundhia ...	Do. ...	*Nil* ...	*Nil* ...	*Nil* ...		
74	10	Do. ...	Deep ...	Do. ...	Do. ...	Do. ...	Do. ...	Do.
63	10	Bájri ...	Ordinary ...	*Nil* ...	*Nil* ...	......	1st year Bájri, 2nd year Potatoes with green manure.	*Nil.*
73	10	Do. ...	Deep ...	*Nil* ...	*Nil* .	......		*Nil.*
65	10	Do. ...	Ordinary ...	*Nil* ...	*Nil* ...	......	1st year Bájri, 2nd year Potatoes with castor-cake.	*Nil.*
75	10	Do. ...	Deep ...	*Nil* ...	*Nil* ...	......		*Nil.*

The results of Bájri, potatoes and Sundhia grown in one year are as under :—

Crop.	Plot No. 61 ordinarily ploughed.				Plot No 71 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Fodder.			Grain.	Fodder.		
	Lbs.	Lbs.	Rs. a. p.	Rs a. p.	Lbs	Lbs.	Rs. a. p.	Rs. a. p.
A. Bájri	680	5,028	31 11 8	38 11 8	796	5,468	25 10 0	41 3 8
B. Potatoes	4,080	...	55 15 4	137 14 4	4,930	...	68 0 0	144 7 4
C. Sundhia	...	6,068	30 5 4	29 12 0	...	5,516	27 9 4	34 12 0

The results of potatoes and Sundhia grown in rotation with the above plot are as under :—

Crop.	Plot No. 62 ordinarily ploughed.				Plot No. 72 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Fodder.			Grain.	Fodder.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
A. Potatoes	7,520	...	103 2 0	133 10 8	8,400	...	115 3 0	138 0 8
B. Sundhia	...	4,616	23 1 4	31 2 0	...	6,724	33 10 0	36 10 0

The results of potatoes and Sundhia grown in rotation with the above plot are as under :—

Crop.	Plot No. 64 ordinarily ploughed.				Plot No. 74 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Fodder.			Grain.	Fodder.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
A. Potatoes	6,180	...	84 12 0	140 0 0	6,860	...	94 1 4	144 1 0
B. Sundhia	...	1,924	45 10 0	32 12 0	...	8,248	41 4 0	39 0 0

The results of Bájri grown in rotation with potatoes manured with green manure are as under :—

Crop.	Plot No. 63 ordinarily ploughed.				Plot No. 73 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Fodder.			Grain.	Fodder.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs,	Rs. a. p.	Rs. a. p.
Bájri	688	5,428	34 4 8	27 14 4	624	6,316	33 6 8	30 6 4

The results of Bájri grown in rotation with potatoes manured with castor-cake are as under :—

Crop.	Plot No. 65 ordinarily ploughed.				Plot No. 75 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Fodder.			Grain.	Fodder.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Bájri	672	5,980	33 9 0	47 13 0	552	6,012	29 14 4	50 7 8

Bájri in all plots is below the average owing to the damage done by the late rains. Potato cultivation was costly owing to the high price of seed potatoes. The seed was purchased at Rs. 2-8-0 per maund and the produce was sold at As. 10 per maund. This is due to the variation in the market. The plot manured with green manure and deeply ploughed has alone given an average outturn. Salt water of the well seems to have had some effect on the potatoes. From the Jowár plots it seems that the green manure leaves less manurial residue for the next crop than farmyard manure.

13. *Series IX.*—The object was to compare the effects of deep and ordinary ploughing on the following crops and rotations and to compare Rozi cotton with Broach cotton :—

(*a*)	1st year	... ...	Kodra and mixture.
	2nd „	... ...	Bájri mixture.
	3rd „	... ...	Broach cotton.
(*b*)	1st year	... ...	Kodra mixture and Rozi cotton.
	2nd „	... ...	Bájri do.

The details of plots, crops, cultivation, etc., are noted below :—

Plot No.	Area in gunthas.	Crop.	Tillage.	Manure.			In rotation or continuous.	Irrigated or not.
				Kind.	Quantity per acre.	Time of application.		
63	10	Kodra mixture.	Ordinary ..	Nil ...	Nil ...	......	In rotation	Nil.
73	10	Do. ...	Deep ..	Nil ...	Nil ...	......	Do. ...	Nil.
66	10	Bájri and mixture.	Ordinary ...	Nil ...	Nil ...	......	Do. ...	Nil.
76	10	Do. ...	Deep ...	Nil ...	Nil ...	......	Do. ...	Nil.
67	10	Cotton ...	Ordinary ...	F. Y. M....	5 tons ...	June ...	Do. ...	Nil.
77	10	Do. ...	Deep ..	Do. ...	Do. ...	Do. ...	Do. ...	Nil.
70	10	Kodra mixture and Rozi cotton.	Ordinary ...	Nil ...	Nil ...	......	Do. ...	Nil.
80	10	Do. ...	Deep ...	Nil ..	Nil ...	......	Do. ...	Nil.
69	10	Bájri mixture and Rozi cotton.	Ordinary ...	F. Y. M....	5 tons ...	June ...	Do. ...	Nil.
79	10	Do. ...	Deep ...	Do. ...	Do. ...	Do. ...	Do. ...	Nil.

Results of Kodra mixture are as under :—

Crop.	Plot No. 68 ordinarily ploughed.				Plot No. 78 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Fodder.			Grain.	Fodder.		
	Lbs	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs a. p.	Rs. a. p.
Kodra	2,080	4,440	41 4 0	18 4 8	1,520	3,080	30 0 0	20 12 8
Tal	40	...	3 6 0		44	...	3 11 4	
		Fibre				Fibre		
Sheria	300	168	15 6 8		148	84	7 10 4	
Tuver	624	728	22 14 4		828	944	30 5 8	
			82 11 0				71 11 4	

Kodra mixture was a very good crop.

The results of Bájri mixture are as under :—

Crop.	Plot No. 66 ordinarily ploughed.				Plot No. 76 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Fodder.			Grain.	Fodder.		
	Lbs.	Lbs.	Rs. a p.	Rs. a. p.	Lbs	Lbs.	Rs. a. p.	Rs. a. p.
Bájri	584	5,280	7 9 0	31 15 4	480	5,056	26 5 0	34 7 4
Math	48	308	1 12 9		44	288	1 11 0	
Mug	208	1,148	8 12 8		160	492	6 12 4	
Tuver		Nil				Nil		
			40 13 4				34 12 4	

Bájri crop is below the average. Tuver plants were totally smothered when the Bájri plants were laid down by rain. Math and Mag also suffered.

The results of Broach cotton are as under :—

Crop.	Plot No. 67 ordinarily ploughed			Plot No. 77 deeply ploughed.		
	Yield per acre.	Value of produce.	Cost of cultivation.	Yield per acre.	Value of produce.	Cost of cultivation.
	Seed cotton.			Seed cotton.		
	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Rs. a. p.	Rs. a. p.
Broach cotton	828	67 4 4	30 14 8	990	80 7 0	33 6 8

On these plots cotton was not attacked with wilt disease. The outturns were very good. The deep ploughed plot has given the better yield.

The results of Kodra mixture with Rozi cotton are as under :—

Crop.	Plot No. 70 ordinarily ploughed.				Plot No. 80 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Fodder.			Grain.	Fodder.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p	Lbs.	Lbs.	Rs a p.	Rs a. p.
Kodra	864	1,748	17 3 0	17 8 8	880	592	17 8 0	20 0 8
Tal	52	...	4 6 0		36	...	3 0 8	
Sheria	140	Fibre 84	7 7 4		184	Fibre 100	9 5 0	
Tuver	608	724	22 5 4		400	483	14 11 8	
Rozi cotton	Seed cotton 42	...	2 10 0		Seed cotton 26	...	1 10 0	
			53 15 8				46 3 4	

The results of Bájri mixture are as under :—

Crop.	Plot No. 69 ordinarily ploughed.				Plot No. 79 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain	Straw.		
	Lbs.	Lbs.	Rs. a. p	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Bájri	572	4,316	28 2 4	37 8 4	474	3,968	23 13 0	40 0 4
Math	24	152	0 14 4		13	96	0 9 4	
Mag	220	1,264	9 6 4		323	1,714	13 11 0	
Tuver	283	440	14 3 4		196	216	7 2 8	
Rozi cotton	Seed cotton 15	...	0 15 0		Seed cotton 16	...	1 0 0	
			53 9 4	37 8 4			46 4 0	40 0 4

14. *Series X.*—The object was to find out which of the following crops, *viz.* Tal, Tuver and Tal and Tuver mixed, leaves a better residue for the next crop. Tal + Tuver and Tal Tuver were sown last year. Bájri was sown on all these plots this year.

The following are the details :—

No. of plot.	Area in gunthas.	Tillage.	Last year's crop.	This year's crop.	Yield per acre.		Value of produce.	Cost of cultivation.
					Grain	Straw.		
					Lbs.	Lbs.	Rs. a. p.	Rs a. p.
83	10	Ordinary ...	Tal ...	Bájri ...	633	6 220	33 2 0	23 2 4
84	10	Do. ...	Tuver ...	Do. ...	572	5,408	23 10 8	22 14 4
85 & 86	20	Do. ..	Tal + Tuver ...	Do. ...	546	4,020	23 3 10	19 5 10

The yield of all the plots is below the average. The plot of Tal has produced a better yield than either Tuver or Tuver + Tal together.

15. *Series XI.*—The object was to investigate the theory of rotations. Tobacco and Bájri are the crops experimented with. All the plots mentioned below are to receive 20 loads of farmyard manure every second year. This will always be applied to tobacco when this crop is grown on the plot. The following are the details :—

Plot.	Area in gunthas.	Crop.	Tillage.	Manure.			In rotation or continuous.	Irrigated or not.
				Kind.	Quantity per acre.	Time of application		
108	10	Tobacco ...	Ordinary ...	F. Y. M....	10 tons ...	June ...	In rotation.	Nil.
109	10	Bájri ...	Do. ..	Nil.	Nil.	Nil.	Do.	Nil.
110	10	Tobacco ...	Do. ...	F. Y. M....	10 tons ...	June ...	Continuous.	Nil.
111	10	Do. ...	Do. ..	Do. ...	Do. ...	Do. ...	Do. ...	Nil.
112	10	Do. ...	Do. ...	Do. ...	Do. ...	Do. ...	Do. ...	Nil.
113	10	Do. ...	Do. ...	Do. ...	Do. ...	Do. ...	Do. ...	Nil.
114	10	Bajri ...	Do. ...	Do. ...	Do. ...	Do. ...	Rotation ...	Nil.
115	10	Fallow ..	...	...	......	......	Do. ...	
116	10	Tobacco ...	Ordinary ...	F. Y M....	10 tons ...	June ...	Rotation ...	Nil.
117	10	Fallow ..	......	...	......	......	Do. ...	
118	10	Bájri ...	Ordinary ...	F. Y. M....	10 tons ...	June ...	Continuous.	Nil.
119	10	Do. ...	Do. ...	Do. ...	Do. ...	Do. ...	Do. ...	Nil.
120	10	Do. ...	Do. ...	Do. ...	Do. ...	Do. ...	Do ...	Nil.
121	10	Do. ...	Do. ...	Do. ...	Do. ...	Do. ...	Do. ...	Nil.

N B.—Plots Nos. 112, 113, 118, 119 are ring plots to test the contemporaneous effects of a fallow and are not under experiment.

The results of Bájri are as under :—

Plot No.	Crop.	Manure.	Yield per acre.		Value of produce.	Cost of cultivation.	Remarks.
			Grain.	Fodder.			
			Lbs.	Lbs.	Rs. a. p	Rs. a. p.	
109	Bájri ...	Nil	376	3,741	21 4 8	16 9 8	In rotation with tobacco.
114	Do. ...	Nil	536	4,648	26 7 4	39 15 0	In rotation with fallow.
118	Do. ...	Farmyard manure.	624	4,912	30 12 4	38 13 0	Continuous.
119	Do. ...	Do. ...	308	4,100	17 12 0	37 7 0	Do.
120	Do. ..	Do. ...	416	3,468	21 14 0	36 9 0	Do.
121	Do. ..	Do. ...	508	3,728	24 12 0	34 1 0	Do.

The crop is below the average.

The results of tobacco are as under :—

Plot No.	Crop.	Manure.	Yield per acre.	Value of produce	Cost of cultivation.	Remarks.
			Cured leaves.			
			Lbs.	Rs. a. p.	Rs a. p	
108	Tobacco ...	Farmyard manure.	280	22 6 4	45 6 8	Damaged by wilt.
110	Do. ...	Do. ...	328	26 3 8	45 6 4	Do.
111	Do. ...	Do. ...	968	58 1 4	51 5 8	Damaged by rain.
112	Do. ..	Do. ...	816	65 4 4	50 8 8	
113	Do. .	Do. ...	1,024	61 7 0	57 0 8	Damaged by rain.
116	Do. .	Do. ...	1,400	84 0 0	62 0 0	Do.

Experiments on crops grown continuously.

16. The object was—

(1) to see how long the following crops can be grown profitably without any manure on the same plots;

(2) to see the effects of deep and ordinary ploughing on Kodra mixture and on Bájri mixture grown continuously.

The following crops were grown continuously :—

(*a*) Bájri and mixture.
(*b*) Kodra and mixture.
(*c*) Bájri.
(*d*) Cotton, Broach.
(*e*) Tobacco (dry).

The Bájri and Kodra mixtures were grown on the following plots :—

Plot No. 137.—Area 5 gunthas, ordinarily ploughed, not manured, sown with Bájri and mixture.

Plot No. 139.—Area 5 gunthas, ordinarily ploughed, not manured, sown with Kodra and mixture.

Plots Nos. 138, 140.—Area 5 gunthas each, deeply ploughed, otherwise crops and treatment same as in plots 137 and 139 respectively.

The results of Bájri mixture are as under :—

Crop.	Plot No. 137 ordinarily ploughed.				Plot No. 138 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Bájri	472	3,696	23 8 8	29 11 4	360	3,128	19 8 0	32 3 4
Math	16	96	0 9 4		24	128	0 13 4	
Mag	456	2,256	18 12 0		400	2,232	16 15 4	
Tuver	376	408	13 11 4		296	324	10 12 8	
Total ...	...	...	56 9 4	29 11 4	...	...	48 1 4	32 3 4

The results of Kodra mixture are as under :—

Crop.	Plot No. 139 ordinarily ploughed.				Plot No 140 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p	Rs. a. p.	Lbs.	Lbs.	Rs a. p	Rs. a. p.
Kodra	941	1,936	18 7 4	19 3 4	616	1,272	12 4 0	21 11 4
Tal	200	...	16 14 0		200	...	16 14 0	
Sheria	112	56 fibre	5 6 8		152	80 fibre	7 8 8	
Tuver	552	616	20 3 4		408	454	11 14 8	
Total ...	...	...	60 15 4	10 3 4	...	...	51 7 4	21 11 4

Cotton, Bájri and tobacco crops were grown on the following plots :—

Plot No. 97.—Area 6 gunthas, ordinarily ploughed, not manured, sown with Broach cotton.

Plot No. 98.—Area 6 gunthas, ordinarily ploughed, not manured, sown with Bájri.

Plot No. 101.—Area 4½ gunthas, ordinarily ploughed, not manured, planted with tobacco.

The results are as under :—

Plot No.	Crop.	Manure.	Yield per acre.		Value of produce.			Cost of cultivation.		
			Grain.	Straw.						
			Lbs.	Lbs.	Rs.	a.	p.	Rs.	a.	p.
97	Cotton	Nil ...	Seed cotton. 263	...	21	6	2	13	13	1
98	Bájri	Do. ...	360	2,833	22	3	0	25	3	10
101 B	Tobacco	Do. ...	Cured leaves 533	...	42	6	10	38	5	1

Bájri was damaged by rain. More than half the area of cotton was destroyed by wilt.

Cultural Experiments.

Series I.—The object was—

(1) to compare Bájri and Bájro sown 1′ apart with Bájri and Bájro sown 1½′ apart ;

(2) to compare the yield of Bájri with that of Bájro ;

(3) to compare Broach cotton sown 1½′ apart with cotton sown 2′ apart.

Bájri and Bájro were grown on the following plots :—

Plot No. 104.—Area 10 gunthas, ordinarily ploughed, not manured, sown with Bájri 1′ apart.

Plot No. 105.—Area 10 gunthas, ordinarily ploughed, not manured, sown with Bájro 1′ apart.

Plot No. 122A.—Area 8½ gunthas, ordinarily ploughed, not manured, sown with Bájri 1½′ apart.

Plot No. 122B.—Area 8½ gunthas, ordinarily ploughed, not manured, sown with Bájro 1½′ apart.

The results of Bájri and Bájro are as under:—

Plot No.	Crop.	Treatment.	Yield per acre.		Value of produce.			Cost of cultivation.		
			Grain.	Straw.						
			Lbs.	Lbs.	Rs.	a.	p.	Rs.	a.	p.
104	Bájri ...	Sown 1′ apart ...	464	4,472	25	8	0	16	13	8
122A	Do. ...	Sown 1½′ apart ..	480	4,094	25	6	3	18	5	3
105	Bájro ...	Sown 1′ apart ...	224	3,068	17	12	0	17	5	8
122B	Do. ...	Sown 1½′ apart ...	237	2,626	15	3	6	17	11	10

The crops are below the average. Bájri sown 1′ apart has given the better return, while Bájro sown 1½′ apart has given the better outturn.

Cotton was sown under similar conditions in the following plots:—

Plot Nos. 102–103.—Area 10 gunthas each, ordinarily ploughed, not manured, and sown with Broach cotton 1½′ apart.

Plot Nos. 106–107.—Area 10 gunthas each, ordinarily ploughed, not manured, sown with Broach cotton 2′ apart.

The results are as under:—

Plot No.	Crop.	Treatment.	Yield of seed cotton per acre.	Value of produce.			Cost of cultivation.		
			Lbs.	Rs.	a.	p.	Rs.	a.	p.
102	Broach cotton ...	Sown 1½′ apart ...	228	18	8	4	17	0	4
103	Do. ...	Do. ...	694	56	7	0	18	4	4
106	Do. ...	Sown 2′ apart ...	394	32	0	4	16	13	0
107	Do. ...	Do. ...	384	31	3	4	15	9	0

The plots were much affected by wilt disease.

18. *Series II.*—The object was to compare Bájri and Guwár sown as separate crops with Bájri and Guwár sown mixed together.

Plot Nos. 123–124.—Area 1 acre, ordinarily ploughed, not manured, sown with Bájri and Guwár mixed together.

Plot Nos. 125–126.—Area 1 acre, ordinarily ploughed, not manured, sown with Guwár.

The results are as under:—

Plot No.	Crop.	Manured.	Yield per acre.		Value of produce.			Cost of cultivation.		
			Grain.	Fodder.						
			Lbs.	Lbs.	Rs.	a.	p.	Rs.	a.	p.
104	Bájri	Nil ...	464	4,172	25	8	0	16	13	8
125, 126	Guwár	Do. ...	865	864	23	5	8	10	13	10
123, 124	Bájri	Do.	352	4,266	29	2	4	21	12	8
	Guwár	Do. ...	380	355						

Bájri was damaged by rain. This year Guwár alone seems to be profitable.

Trial of new crops.

19. *Cotton.*—The object was—

(1) to introduce Lálio and Wágad cottons which are extensively grown in the Ahmedabad District;

(2) to see whether Lálio cotton can be grown profitably with irrigation.

The results are as under :—

Plot No.	Area.	Crop.	Tillage.	Manure.	Irrigated or not.	Yield of seed cotton per acre.	Value of produce.			Cost of cultivation.		
						Lbs.	Rs.	a.	p.	Rs.	a.	p.
81 82	20	Lálio ...	Ordinary .	F. Y. M. .	Irrigated .	709	57	11	0	52	7	8
127	20	Do. ...	Do. ...	Nil ...	Nil ...	491	39	14	4	15	6	4
128	20	Wágad ...	Do. ...	Do. ...	Do. ...	311	25	4	4	16	8	2

Lálio irrigated was a very promising crop but nearly half the area was destroyed by "wilt disease."

20. *Dhárwár-American cotton.*—About 20 gunthas were sown with this cotton. The germination was not satisfactory. The germinated plants were attacked with white ants and wilt disease. The whole plot was ploughed in.

The following varieties of cotton were sown on a small area to see the variation in the percentage of lint due to differences in soil and climate:—

No.	Name of the cotton variety.	Percentage of lint to seed-cotton.
1	Devkapás	25·3
2	Rozi	26·3
3	Naden	31·6
4	Wágad	28
5	Kumpta	27·5
6	Broach	31·8
7	Goghári	33·3
8	Mathio	27·2
9	Jari	28·5
10	Varádi	35·2
11	Comilla	44·5
12	Bani	26

21. *Bájri.*—The following new varieties were grown :—

(1) Natal Bájri.
(2) West African Bájri.

The results are as under :—

Plot No.	Area in gunthas.	Crop.	Tillage.	Manure.	Yield per acre.		Value of produce.	Cost of cultivation.
					Grain.	Fodder		
					Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
96	13	Natal Bájri ...	Ordinary .	Nil ...	323	4,997	19 8 3	17 4 6
142	6	West African Bajri.	Do. ...	Do. ...	1,063	5,506	37 15 9	27 2 5

Natal Bájri was much damaged by rain. The growth was just like ordinary Bájri : the ear was somewhat longer and the grain smaller.

West African Bájri was not much affected by rain. The stalks were thick with plenty of aëreal roots. The leaves were broader than ordinary Bájri plants and the appearance of the crop was like maize. The ears were very long, some measuring 21 inches. The grain was very small and yellow.

22. *Soybeans.*—The following varieties of soybeans were grown :—

I.—Black-seeded.
II.—Yellow-seeded.
III.—Extra early black-seeded.
IV.—Extra early.

These varieties were first sown in May. The germination was not satisfactory owing to excesssive heat. The germinated plants were parched up. The seed was again sown in the monsoon. The germination was fair. The plants were progressing well till the end of August, but owing to heavy and constant rains all the plants rotted. The yield was practically nothing. A few plants only seeded.

23. *Groundnut.*—The object was to treat the plots as a protection against white ants.

Four plots, each one guntha in area, were put under groundnut as under :—

(1) To be treated with Jámbho as green.
(2) To be treated with kerosine.
(3) To be treated with castor-cake.
(4) To be treated with nothing.

The results are as under :—

Area in gunthas.	Crop.	Treatment.	Number of waterings.	Yield per acre.		Extent of damage.	Remarks.
				Good Pods.	Rotten Pods.		
1	Groundnut.	Green manure of Jámbho.	7	7 0	440	33·3 per cent	Jámbho was grown in the cold weather of 1903 and was ploughed in; a few patches were made by white ants. Crop was looking rather pale.
1	Do. ...	Castor-cake..	7	1,120	320	27·7 ,, ...	A few plants were seen destroyed by white ants; 15 lbs. castor-cake was applied in 2 doses.
1	Do. ...	Kerosine ...	7	840	2 0	25 ,, ...	Kerosine (3 lbs.) was applied to 6 waterings; a few plants were seen attacked by white ants. Crop looked paler.
1	Do. ...	Nil ..	7	680	460	11·3 ,, ..	Much attacked with white ants. Crop much paler.

Green manure in addition to its manurial value seems to have some effect on white ants.

Castor-cake seems to have less effect on white ants than kerosine, but appears to influence the yield greatly.

The kerosine oil appears to have had a good effect on white ants.

24. *China mustard.*—Two varieties, *viz.*, Cai Trang and Cai Sen, were transplanted in December. The plants grew very luxuriantly but the yield of grain was very poor.

The percentages of oil in these varieties are as under :—

Cai trang	... ...	30·57 per cent.
Cai sen	... ...	31·42 „

25. *San.*—This year again san was sown for fibre and seed. The plants grew very vigorously but owing to heavy rains no pods were formed.

The results are as under :—

No.	Area in gunthas.	Crop.	Yield per acre.		Value of produce.	Cost of cultivation.
			Grain.	Fibre.		
			Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
96	12	San ...	66	473	25 5 3	28 0 7

Extracting fibre by hired labour is very costly. A sample of San fibre was valued by the Bombay Chamber of Commerce at Rs. 60 per candy of 588 lbs. and of Ambádi at Rs. 40.

26. *Kamod rice.*—Kamod rice was again planted this year, but owing to the sandy nature of the soil it was not successful as this variety requires plenty of water. It was watered four times from the well.

The following are the results :—

No.	Area in gunthas.	Crop.	Treatment.	Yield per acre.		Value of produce.	Cost of cultivation.
				Grain.	Fodder.		
				Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
92	7	Rice ...	F. Y. M. ...	685	2,783	39 4 7	55 9 0

27. *Barley.*—A sample of a six-rowed barley variety called Mandeschendi was sown on a small area in the rabi season. The seed did not germinate.

28. *Wheat barley.*—A sample of wheat barley from Cawnpore was sown on a small area. The germination was good. The plants did not grow vigorously. They were smaller than ordinary barley. The yield was poor, *viz.*, 120 lbs. per acre.

29. *Tobacco.*—The following statement gives the details of several varieties of tobacco grown on this farm:—

Name of the variety.	No. of ripe leaves.	Height of the plant.	Measurement of the top leaf.	Measurement of the largest leaf.	Remarks.
Talaon ...	17	2′ 10″	7″ × 14″	11″ × 18″	Greenish, thickest, not spotted.
Havana ...	15	2′ 8″	6″ × 11″	12″ × 16″	Reddish, thick, brittle spotted.
Java P. ...	16	3′ 5″	6″ × 10″	11½″ × 15″	Yellowish, thick, spotted.
Wlingi ...	18	2′ 6″	7″ × 11″	9½″ × 15″	Whitish, thick, spotted.
Spanish ...	16	2′ 10″	6½″ × 10″	9″ × 14″	Reddish yellow, thick midrib, very thick spotted.
Florida ...	18	3′ 2″	5½″ × 13″	9″ × 15½″	Yellowish leaves thin and narrow.
Java D. ...	19	3′ 5″	7½″ × 12″	9½″ × 15″	Yellowish, brittle thick and narrow.
Sumatra ...	21	3′ 6″	7″ × 12″	9″ × 15″	Yellowish, leaves conical.

All these varieties are more or less degenerating. A curing house is now constructed and experiments on curing on improved methods will be undertaken next season.

Pests.

30. *Sugarcane borer (Chilo simplex).*—The attack was detected in May when the sugarcane sets were sprouting. The attack was severe and the damage done to the young crop was great.

31. *Caterpillars.*—The crops of rice, tobacco, cotton and brinjals were attacked with caterpillars. The attack was slight.

32. *Kátras or hairy caterpillars.*—In the beginning of July Kátras were seen attacking Bájri, cotton, San, etc. They preferred San to other crops. The attack was slight.

33. *White ants.*—Owing to the sandy nature of the soil white ants are very disastrous. The whole crop of chillies and sugarcane was damaged by them.

34. *Smut.*—See above.

The farm seed was steeped before sowing in ½ per cent. copper sulphate solution but unfortunately the printed instructions followed (not issued by me) were faulty. Correct instructions have now been issued.

35. *Wilt disease.*—Some of the cotton and tobacco plots were very much damaged by this disease.

36. *Bángdi blight.*—A very few plants of potatoes were seen attacked with this blight in the young stage. The damage was very slight. The attacked plants were removed and burnt.

37. *Mildew.*—On account of rain in the beginning of February the crop of jiru was attacked with mildew. Subsequently much more damage was done to the crop by subsequent rain than by mildew.

Cross Breeding.

38. Several crosses made last year were sown this season. The following crosses grew vigorously :—

Tree cotton + Abassi.
Do. + Sea Island.
Do. + Texas big boll.

The following table gives the details of crosses made during this year :—

Rough Peruvian × Kidney.			Kidney × Rough Peruvian.			Kidney × 16 *x*.		
Number of flowers crossed.	Number of bolls formed.	Number of bolls obtained.	Number of flowers crossed.	Number of bolls formed.	Number of bolls obtained.	Number of flowers crossed.	Number of bolls formed.	Number of bolls obtained.
64	50	9	134	72	43	55	20	12

Irrigational Experiments.

39. To find out what quantity of water is required by each irrigated crop, the quantity of water supplied at each irrigation was measured either through the rectangular notch or by measuring tanks.

The following table gives the details of the quantity of water taken by several crops per acre during the year under report :—

Crop.	Quantity of water at the time of sowing.	Quantity of water at the first watering.	Quantity of water at the 2nd watering.	Total Number of waterings.	Total quantity of water applied.
	Gallons.	Gallons.	Gallons.		Gallons.
Tobacco	Nil.	41,250	40,000	3	112,825
Variáli	Do.	56,250	70,000	9	486,912
Chillies	Do.	82,500	52,500	13	562,700
Wheat	107,500	76,250	80,000	7	500,262
Rice	Nil.	94,117	67,575	2	161,692
Brinjals	Do.	44 444	41,666	12	524,830
Jiru	77,500	43,750	37,500	4	201,250
Lálio cotton	Nil.	60 000	40,000	3	127,250
Potatoes	97,500	37,500	37,500	7	313,750
Sundhia Jowár	64,650	66,562	42,975	6	294,262
Onion	60,000	37,500	38,812	14	528,487

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1907/08

Department of Agriculture, Bombay.

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ANNUAL REPORT

OF THE

EXPERIMENTAL WORK

OF THE

NADIAD AGRICULTURAL STATION

(Kaira District, Gujarát)

FOR THE YEAR

1907-1908

BY

T. FORSTER MAIN, B.Sc.,

Deputy Director of Agriculture, Bombay Presidency.

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THE NADIA'D AGRICULTURAL STATION, 1907-08.

Established—1903; *North Latitude*—22° 44′; *East Longitude*—73° 0′; *Elevation*—approximately sea level; *Soil*—alluvial loam (Ver. Gorádu); *Average rainfall*—33′ 56″; *Temperature*—maximum 112° in May, minimum 40° in February.

Area—44 acres.

Superintendent—Mr. Dattatraya Hari Tagare.

Season.

	April.	May.	June.	July.	August.	September.	October.	November.	December.	January.	February.	March.	Total.
Rainfall—	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″
(1907-08)	0 13	0 0	1 52	18 94	24 94	0 3	0 0	0 0	0 0	0 13	0 0	0 0	45 69
	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″
Average	0 2	0 15	4 13	12·69	10 53	5 11	0 44	0 25	0 2	0 1	0 15	0 6	33 53
Temperature (1907-08)—													
Mean maximum ...	101°	106°	101°	96°	85°	94°	101°	89°	82	81°	86°	95°	
Mean minimum ...	75°	76°	83°	81°	77°	76°	66°	55°	46°	49°	49°	57°	

2. The first shower of rain came somewhat early on the 14th June. The rainfall recorded on that day on the farm was only 1′ 15″. The moisture was not sufficient to commence sowing operations; about 3 miles off on the eastern side of the farm, the rainfall on the same day was 3 inches. Cultivators on that side commenced sowing operations early. Owing to the insufficient moisture, much of the seed sown did not germinate. Afterwards there was a long break of 40 days. Crops were all withered. At last rain fell on the 24th July. There was a continuous rain for 40 days up to the 24th August. There was no opportunity during this time to sow the seed. The sowing of Kodra was over timed. Every seed was required to be sown three or four times. Several cultivators sowed Kodra, Bájri and Sundhia in the same field, according to rainfall. Kodra sown at the first fall did not germinate, owing to insufficient moisture; then, in July, Bájri was sown but it did not germinate owing to heavy and continuous rain; then, lastly, Sundhia was sown. Owing to heavy and continuous rain the seed did not germinate and the

standing crops all became rotten. The soluble nourishing ingredients were washed away. Nearly all the fields were sown after the 25th August. There was no rainfall at all in September. The sandy soil of the farm became welded into a hard mass, and the roots of the standing crops were subjected to severe pressure on all sides. The growth of the plants was stunted. Kodra totally failed. Bájri grew well till flowering, but failed to produce any grain on account of failure of late rains. Tobacco could not be planted as there was no late rain. Besides, the seedlings had rotted in the nursery beds on account of continuous rain. There was no plantation of dry crop tobacco. All the tobacco fields were irrigated at the time of transplantation; cotton plants became rotten and those which survived did not grow taller than a foot. The season, on the whole, was quite unfavorable, both to Khariff and Rabi crops, though the total rainfall was abundant.

Manurial Experiments.

3. *Irrigated Tobacco.*—The object was—

(1) to compare the effects of the following manures :

- (*a*) Farmyard manure,
- (*b*) Castor-cake,
- (*c*) Farmyard manure + castor-cake,
- (*d*) Farmyard manure + nitre,
- (*e*) Farmyard manure + sodium nitrate,
- (*f*) Farmyard manure + ammonium sulphate,
- (*g*) San ploughed in as green manure ;

(2) to compare tobacco grown in rotation with tobacco grown continuously ;

(3) to compare the effects of ordinary and deep ploughing on tobacco.

By deep ploughing is meant ploughing with an English Turn wrest plough, followed by a country wooden plough in the same furrow.

The following table shows the details of cultivation of the several tobacco plots with the results obtained in the year under report :—

Plot No.	Area in gun-thas	Crop.	Tillage.	Manure. Kind.	Manure. Quantity per acre.	Manure. Date of application of manure.	Continuous or in rotation.	Crops grown in rotation.	Irrigated or not.	Results per acre. Outturn of cured leaves.	Results per acre. Value of produce.	Results per acre. Cost of cultivation.	Anna valua-tion.	Remarks.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
										Lbs.	Rs. a. p.	Rs. a. p.		
1	10	Tobacco .	Ordinary ...	Farmyard manure .	15 tons ...	June ...	Continuous ...	......	Irrigated.	914	79 5 4	77 7 11	7½	
12	10	Do. ...	Deep ...	Do. ...	Do. ...	Do. ...	Do. ...	......	Do. ...	1,290	111 15 0	80 14 8	10	
2	10	Do. ...	Ordinary ...	Castor-cake ...	2,000 lbs. ...	October ...	Do. ...	......	Do. ...	1,141	99 0 0	90 7 4	9	
13	10	Do. ...	Deep ...	Do. ...	Do. ...	Do. ...	Do. ...	......	Do. ...	1,672	145 0 4	94 8 4	13½	
3	10	Do. ...	Ordinary	Farmyard manure . + Castor-cake ...	10 tons ... 600 lbs. ...	June ... October ...	Do. ...	......	Do. ...	1,493	129 8 4	86 4 8	12	
14	10	Do. ...	Deep ...	Do. ...	Do. ...	Do. ...	Do. ...	......	Do. ...	1,850	160 8 4	90 10 8	15	
4	10	Do. ...	Ordinary	Farmyard manure . + Nitre	10 tons ... 112 lbs. ...	June ... October ...	Do. ...	......	Do. ...	1,314	116 9 0	89 3 0	10½	
15	10	Do. ...	Deep ...	Do.	Do. ...	Do. ...	Do. ...	......	Do. ...	1,736	150 9 0	90 11 0	14	
5	10	Do. ...	Ordinary	Farmyard manure . + Sodium nitrate ...	10 tons ... 112 lbs. ...	June ... October ...	Do. ...	......	Do. ...	1,328	115 0 0	89 5 8	10½	
16	10	Do. ...	Deep ...	Do. ...	Do. ...	Do. ...	Do. ...	......	Do. ...	1,562	135 8 0	94 15 8	12½	
23	10	Do. ...	Ordinary ...	Green manure of San.	San was sown in June and ploughed in September.		Do. ..	......	Do. ...	208	18 0 8	63 4 0	1½	
34	10	Do. ...	Deep ...	Do. ...	Do. ...	Do. ...	Do. ...	......	Do. ...	888	77 0 4	63 9 0	7	
21	10	Do. ...	Ordinary ...	Do. ...	Do. ...	Do. ...	In rotation.	1st year Tobacco . 2nd year Kodra ...	Do. ..	813	70 8 8	64 10 4	6½	
35	10	Do. ..	Deep ...	Do. ...	Do. ...	Do. ...	Do. .	Do. ...	Do. ...	1,112	96 7 4	67 7 0	9	
23	10	Do. ...	Ordinary ...	Farmyard manure .	15 tons ...	June ...	Do. ...	Do. ...	Do. ...	1,261	109 6 4	88 8 4	10	
37	10	Do. ...	Deep ...	Do. ...	Do. ...	Do. ...	Do. ...	Do. ...	Do. ...	1,344	116 9 0	89 15 3	10½	
141-B	6	Do. ...	Ordinary	Farmyard manure . + Ammonium sulphate.	10 tons ... 112 lbs. ...	June ... October ...	Continuous .	......	Do. ...	1,316	114 1 3	93 15 3	10½	
141-A	6	Do. ...	Do. ...	*Nil* ..	*Nil* ...	......	......	......	Do. ..	1,380	119 11 0	64 8 2	11	

Tobacco at the start grew vigorously but, at the time of ripening, a parasite, called vacumba (Orobanche, Nicotiana), attacked the crop. The attack was severe. The yield is somewhat less, owing to this parasite. To check this parasite, Sundhia is grown in the hot weather in the tobacco fields. In America, lime is also tried to minimise the damage. Tobacco manured continuously with green manure totally failed. This shows that green manure cannot be applied every year.

During the past two years green manure of San gave a heavy yield. But this year the yield is very low. The plants when transplanted showed signs of withering. A small portion was watered to see whether irrigation improves the condition, but it had no effect. On the contrary, the irrigated portion totally failed. The failure of Tobacco may probably be accounted for by three reasons.

I.—The green manure of San is deficient in some nutriments which are essential in the early growth of Tobacco.

II.—San may excrete a substance which may have an injurious toxic influence upon Tobacco.

III.—The effect of continuous green manuring may leave the texture of the soil in such an open condition that it can neither hold the water present in the soil, nor benefit to the full when irrigation water is supplied. It is intended to continue the same experiment and to further investigate these possible explanations.

In the trial this year the manures applied gave the following results :—

	Annas crop.
Farm yard manure + castor-cake	15
Farm yard manure + nitre	14
Castor-cake	13½
Farm yard manure + sodium nitrate	12½

Deep ploughing produced good results in all the plots.

This experiment has now been conducted for three successive years, and the following statement tabulates the average results obtained on each plot.

Details of the results of manurial experiments on tobacco made on the Nadiad Farm 1905-06 to 1907-08.

No. of the plot.	Crop.	Tillage.	Manure.		Cost of manure per acre.	Outturn per acre for the year.			Average outturn per acre.	Value of average outturn per acre.	Net value of the produce after deducting the cost of manure.
			Kind.	Quantity per acre.		1905-06.	1906-07.	1907-08.			
				Lbs.	Rs. a. p.					Rs. a. p.	Rs. a. p.
1	Tobacco ..	Ordinary ...	F. Y. M. ...	30,000	22 8 0	2,232	1,780	914	1,642	142 6 8	119 14 8
12	Do. ...	Deep ...	Do. ...	30,000	22 8 0	2,364	1,760	1,290	1,771	153 9 8	131 1 8
2	Do. ...	Ordinary ...	Castor-cake ...	2,000	37 8 0	2,060	1,504	1,141	1,568	136 0 0	98 8 0
13	Do. ...	Deep ...	Do. ...	2,000	37 8 0	2,272	1,428	1,672	1,791	155 5 5	117 13 5
3	Do. ...	Ordinary ...	F. Y. M. ... + Castor-cake ...	20,000 600	15 0 0 11 4 0	2,356	1,992	1,493	1,947	168 13 11	142 9 11
4	Do. ...	Deep ...	Do. ...	20,000 600	15 0 0 11 4 0	2,558	1,984	1,850	2,131	184 13 4	158 9 4
4	Do. ...	Ordinary ...	F. Y. M. ... + Nitre ...	20,000 112	15 0 0 12 7 1	2,508	1,240	1,344	1,697	147 3 0	119 11 11
15	Do. ...	Deep ...	Do. ...	20,000 112	15 0 0 12 7 1	2,460	1,564	1,736	1,920	167 12 11	140 5 10
5	Do. ...	Ordinary ...	F. Y. M. ... + Sodium nitrate ...	20,000 112	15 0 0 11 3 2	2,520	1,224	1,328	1,691	146 10 8	120 7 6
16	Do. ...	Deep ...	Do. ...	20,000 112	15 0 0 11 3 2	2,436	1,608	1,562	1,869	162 1 8	135 14 6
141	Do. ...	Ordinary ...	F. Y. M. ... + Ammonium sulphate.	20,000 112	15 0 0 11 3 2	2,056	1,490	1,316	1,621	140 9 7	114 6 5

The general conclusions which may be drawn from the figures shown in the above tabular statement are :—

(*a*) Deep cultivation has, in every case, increased the net profits by amounts varying from Rs. 12 to 21 per acre.

(*b*) In the case of the plots receiving ordinary cultivation only two of the manures have increased the net profit, while two have decreased it; and in one case the expenditure upon the manure has just equalized the increased value of the produce.

Castor-cake used alone and ammonium sulphate have both resulted in losses, amounting to Rs. 21 and Rs. 5 per acre, respectively. Nitre used in association with farm yard manure has nearly covered expenses, while castor-cake plus + farm yard manureand sodium nitrate + farm yard manure have each resulted in a net profit, amounting to Rs. 23 and Re. 1 per acre, respectively.

(*c*) In the case of the deep cultivated plots, it will be seen that deep cultivation has not only itself increased the yield but has enhanced the value of all the manures used.

(*d*) In the case of the deep cultivated plots, the manures retain their relative positions *inter se* as mentioned under (*b*) with regard to the ordinary cultivated plots, but, in every case, better results are recorded.

Castor-cake + farm yard manure and sodium nitrate + farm yard manure have both increased the net profit to the extent of Rs. 27 and Rs. 4 per acre, while the loss in using castor-cake alone has fallen to Rs. 14 as against the similar plot cultivated in the ordinary manner. Nitre has also improved ; it shows a net profit of Rs. 9 per acre against zero in the ordinary cultivated plot.

(*e*) The general inference is that all of the manures, when associated with a bulky manure, like farm yard manure, and with good tillage, can be used with great advantage upon the tobacco crop, leaving a considerable increased net profit per acre after allowing for all increased expenditure. The most promising supplementary manure to farm yard manure appears to be castor-cake, but it is probable that all of these artificials could be made to leave greater net profits, if more judiciously applied as the light of pint experience. It is satisfactory to note the results recorded for castor-cake because this article is largely manufactured at Sábarmati Mills in Ahmedabad, and is sold at reasonable rates in Northern Gujarát.

4. *Rice.*—The objects of this experiment were—

(1) To compare farm yard manure with nitre.

(2) To compare rice manured and irrigated with rice manured but not irrigated.

(3) To compare rice grown unmanured and unirrigated with rice grown manured and unirrigated.

The results were as under:—

Plot No.	Area in gunthas.	Crop.	Tillage.	Manure.			Irrigation	Yield per acre.		Value of produce.	Cost of cultivation.	Anna valuation.
				Kind.	Quantity per acre.	Time of of application.		Grain.	Straw.			
								Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	
90	6	Rice	Ordinary	Farm yard manure + Nitre ...	7½ tons 80 lbs.	June August	Nil	893	3,173	43 7 5	36 10 8	5½
91	6	Do.	Do. ...	Nil ...	...	...	Nil	860	2,206	41 12 10	14 14 4	5
93	5·5	Do.	Do. ...	Farm yard manure.	7½ tons	June	Nil	407	1,527	23 1 1	33 10 2	2½
94	6	Do.	Do. ...	Farm yard manure + Nitre ...	7½ tons 80 lbs.	June August	Irrigated.	1,633	3,260	74 5 5	59 9 4	10
95	8·5	Do.	Do. ...	Farm yard manure.	7½ tons	June	Do.	711	1,906	26 13 0	41 15 9	4½

Owing to the failure of late rains, Rice did not prove a successful crop.

Rotation Series Experiments.

5. *Series I.*—The object was to see the effects of ordinary and deep ploughing on the following rotation and to compare it with others:—

1st year	...	(a) Bájri. (b) Jiru and Kareli.
2nd ,,	...	Sundhia.
3rd ,,	...	Kodra and mixture.

The following table shows the details of the plots and cultivation in this series:—

Plot No.	Area.	Crop.	Tillage.	Manure.			In rotation or continuation.	Irrigated or not.
				Kind.	Quantity per acre.	Time of application.		
7	10	(a) Bajri ... (b) Jiru + Kareli. ...	...... Ordinary ...	... Farm yard manure.	... 10 tons ...	... November	... In rotation ...	Nil. Irrigated.
13	10	Do. ...	Deep ...	Do. ..	Do. ...	Do. ...	Do. ...	Do.
8	10	Sundhia ..	Ordinary ...	Nil ...	Nil ...	Nil ...	Do. ...	Nil.
19	10	Do. ...	Deep ...	Nil ...	Nil ...	Nil ..	Do. ...	Nil.
6	10	Kodra mixture ...	Ordinary ...	Nil ...	Nil ...	Nil ...	Do. ...	Nil.
17	10	Do. ...	Deep ...	Nil ...	Nil ..	Nil ...	Do ...	Nil.

The results of Bájri and Jiru are as under :—

Crop.	Plot No. 7 ordinarily ploughed.				Plot No. 18 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Bájri	54	1,084	9 1 4	12 9 8	98	1,392	11 10 0	15 1 8
Jiru	312	...	55 7 4	47 15 0	256	...	45 8 0	46 13 0

The Bájri crop is not even one anna. The Jiru crop is a 5-anna crop.

The results of Sundhia are as under :—

Crop.	Plot No. 8 ordinarily ploughed.				Plot No. 19 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Sundhia	120	668	23 3 0	11 9 4	240	3,448	37 5 0	15 13 4

The results of Kodra mixture are as under :—

Crop.	Plot No. 6 ordinarily ploughed.				Plot No. 17 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Kodra	4	96	0 5 0	12 8 4	12	232	0 13 8	15 3 0
Tal	1¾	...	0 3 4		8½	...	1 0 2	
Tur	...	...	......		...	...	......	
Sheria	6	Fibre 4	0 8 0		1	Fibre. ⅛	0 1 2	
			1 0 4				1 15 0	

This year Kodra mixture was a total failure.

6. *Series II.*—The object was to see the effects of ordinary and deep ploughing on the following rotation and to compare it with others :—

1st year	...	Bájri, Math and Tur.
2nd „	...	Kodra mixture.
3rd „	...	Sundhia.

The following table shows the details of plots and rotation under this series :—

Plot No.	Area in gunthae.	Crop.	Tillage.	Manure.			In rotation or continuous.	Irrigated or not.
				Kind.	Quantity per acre.	Time of application.		
10	10	Bajri + Tur + Math.	Ordinary ..	Farm yard manure.	5 tons ...	June ..	In rotation.	*Nil.*
21	10	Do. ...	Deep ...	Do. ...	Do. ...	Do. ...	Do. ...	*Nil.*
11	10	Kodra Mixture.	Ordinary ...	.. ...	*Nil* ...	......	Do. ...	*Nil.*
22	10	Do. ...	Deep ...	......	*Nil* ...	......	Do. ...	*Nil.*
9	10	Sundhia ...	Ordinary ...	......	*Nil* ...	......	Do. ...	*Nil.*
20	10	Do. ...	Deep ...	......	*Nil* ...	......	Do. ...	*Nil.*

The results of Bájri and mixture are as under :—

Crop.	Plot No. 10 ordinarily ploughed.				Plot No. 21 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Bájri	30	481	6 12 4	23 12 2	90	744	11 10 0	26 13 2
Tur	2	12	0 2 0		...	...	......	
Math	106	488	8 10 4		152	404	6 11 8	
			15 8 8				18 5 8	

Results of Kodra and mixture are as under :—

Crop.	Plot No. 11 ordinarily ploughed.				Plot No. 22 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Kodra	128	500	5 0 0	11 5 4	72	372	3 0 0	13 13 4
Tal	1¾	...	0 3 4		1¾	...	0 3 4	
Tur	1¼	8	0 1 4		...	...	......	
Sheria	40	Fibre 12½	2 8 6		9	Fibre 4	0 10 4	
			7 13 2				3 13 8	

The results of Sundhia are as under :—

Crop.	Plot No. 9 ordinarily ploughed.				Plot No. 20 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Sundhia	40	1,008	15 9 0	15 0 0	160	1,488	24 12 8	17 8 0

7. *Series III.*—The object was to see the effects of deep and ordinary ploughing on the following rotation and to compare it with others :—

(*a*) 1st year ... ... Tobacco manured with farmyard manure.
2nd „ ... ... Kodra mixture.
(*b*) 1st „ ... ... Tobacco manured with green manure.
2nd „ ... ... Kodra mixture.

The details of plots and cultivation in the series are as under :—

Plot No.	Area in gunthas.	Crop.	Tillage.	Manure.			In rotation or continuous	Irrigated or not.
				Kind.	Quantity per acre.	Time of application.		
24	10	Tobacco ...	Ordinary ...	Green Manure	......		In rotation.	Irrigated
35	10	Do. ...	Deep ...	Do. ...	......	......	Do. ...	Do.
25	10	Kodra Mixture.	Ordinary ...	*Nil* ...	*Nil* ...	......	Do. ...	*Nil.*
36	10	Do. ...	Deep ...	*Nil* ...	*Nil* ...	......	Do. ...	*Nil.*
26	10	Tobacco ...	Ordinary ...	F. Y. M	15 tons ...	June ...	Do. ...	Irrigated.
37	10	Do. ...	Deep ...	Do. ...	Do. ...	Do. ...	Do. ...	Do.
27	10	Kodra Mixture.	Ordinary ...	*Nil* ...	*Nil* ...	......	Do. ...	*Nil.*
38	10	Do. ...	Deep ...	*Nil* ...	*Nil* ...	......	Do. ...	*Nil.*

The results of Kodra and mixture rotated with Tobacco manured with green manure are as under :—

Crop.	Plot No. 25 ordinarily ploughed.				Plot No. 30 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Kodra	120	592	4 15 0	14 1 0	40	424	2 1 8	15 13 0
Tal	8	...	0 15 2		15	...	1 12 6	
Sheria	6	Fibre 5	0 9 0		1	Fibre $\frac{3}{4}$	0 1 4	
Tur	...	...	......		...	...	......	
			6 7 2				3 15 6	

The results of Kodra and mixture rotated with Tobacco manured with farm yard manure are as under :—

Crop.	Plot No. 27 ordinarily ploughed.				Plot No. 38 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Kodra	90	1,788	5 3 4	11 14 8	352	620	12 3 8	13 10 8
Tal	30	...	2 7 0		17	...	2 1 8	
Tur	...	...	......		...	...	......	
Sheria	15	Fibre 4	0 14 4		1	Fibre ½	0 1 4	
			8 8 8				14 6 8	

8. *Series IV.*—The object was to see the effects of deep and ordinary ploughing on the following rotation and compare it with others :—

1st year	Variáli.
2nd „	(*a*) Bájri. (*b*) Onions.
3rd „	Kodra and mixture.

The following table gives the details of plots and cultivation in this series :—

Plot No.	Area in gunthas.	Crop.	Tillage.	Manure.			In rotation or continuous.	Irrigated or not.
				Kind.	Quantity per acre.	Time of application.		
29	10	Variáli ...	Ordinary ...	F. Y. M. ...	10 tons ...	June ...	In rotation.	Irrigated.
40	10	Do. ...	Deep ...	Do. ...	Do. ...	Do. ...	Do. ...	Do.
30	10	(*a*) Bájri ...	Ordinary ...	*Nil* ..	......	......	Do.	*Nil.*
		(*b*) Onions ...	Do. ...	Castor-cake.	800 lbs. ...	January ...		Irrigated.
41	10	Do. ...	Deep ...	Do. ...	Do. ...	Do. ..	Do. ...	Do.
28	10	Kodra mixture	Ordinary ...	*Nil* ...	*Nil* ...	......	Do. ...	*Nil*,
39	10	Do. ...	Deep ...	*Nil* ...	*Nil* ...	......	Do. ...	*Nil.*

The results of Variáli are as under :—

Crop.	Plot No. 29 ordinarily ploughed.				Plot No. 40 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p	Lbs.	Lbs.	Rs. a. p.	Rs. a p.
Variáli	1,944	...	220 6 4	102 12 0	1,710	...	206 10 0	105 1 0

Variáli was a very good crop. It is more than a 16-anna crop.

The results of Bájri and Onions are as under :—

Crop.	Plot No. 30 ordinarily ploughed.				Plot No. 41 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
A. Bájri	348	834	35 1 4	14 4 4	166	724	32 12 4	17 6 4
B. Onions	5,880	...	73 8 0	84 4 0	6,320	...	79 0 0	93 10 0

Bájri in plot 30 was a 3½-anna crop, while that in plot 41 was a 2-anna crop. Owing to the sandy nature of the plots the onion crop was not profitable. It was below average.

The onion crop in plot No. 30 was a 6½-anna crop and in plot 41 a 7½-anna crop.

The results of Kodra and mixture are as under :—

Crop.	Plot No. 28 ordinarily ploughed.				Plot No. 39 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs a. p.	Rs. a. p.
Kodra	124	1,428	6 11 8	10 12 8	60	718	3 5 8	12 8 8
Tal	6	...	0 11 8		3	...	0 5 8	
Tur	...	...	......		...	...	......	
Sheria	34	Fibre 13	2 4 8		3	Fibre 1	0 3 0	
			9 12 0				3 14 4	

9. *Series V.*—The object was to see the effects of deep and ordinary ploughing on the following rotation and to compare it with others :—

1st year	... ...	Bájri and mixture.
2nd „	... ...	Kodra and mixture.
3rd „	... ...	Bávto, Vál and Castors.

The following table shows the details of plots and cultivation in this series :—

Plot No.	Area in gunthas.	Crop.	Tillage.	Manure.			In rotation or continuous.	Irrigated or not.
				Kind.	Quantity per acre	Time of application.		
32	10	Bájri mixture ...	Ordinary ...	Farm Yard Manure.	5 tons ...	June ...	In rotation...	*Nil.*
43	10	Do. ...	Deep ...	Do. ...	Do. ...	Do. ...	Do. ...	*Nil.*
33	10	Kodra mixture ...	Ordinary ...	*Nil* ...	*Nil* ...	...	Do. ...	*Nil.*
44	10	Do. ...	Deep ...	*Nil* ...	*Nil* ...	...	Do. ...	*Nil.*
31	10	Bávto, Castors and Vál.	Ordinary ...	*Nil* ...	*Nil* ...	...	Do. ...	*Nil.*
42	10	Do. ...	Deep ...	*Nil* ...	*Nil* ...	...	Do. ...	*Nil.*

The results of Bájri mixture are noted below :—

Crop.	Plot No. 32 ordinarily ploughed.				Plot No. 43 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Bájri	52	261	7 14 0	21 9 0	30	72	6 15 0	21 1 0
Mag	28	164	1 5 0		16	112	0 14 0	
Math	82	232	3 11 0		64	208	2 14 4	
Tur	1	7	0 1 4		1	9	0 1 4	
			12 15 4				10 12 8	

The results of Kodra mixture are as under :—

Crop.	Plot No. 33 ordinarily ploughed.				Plot No. 44 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Kodra	60	436	2 11 8	14 0 0	56	416	2 9 4	16 8 0
Tal	5	...	0 10 4		6	...	0 11 8	
Tur	...	...	......		2	8	0 2 0	
Sheria	13	Fibre 5	0 14 4		32	Fibre 8	1 14 8	
			4 4 4				5 5 8	

The results of Bavto, Castors and Wál are as under :—

Crop.	Plot No. 31 ordinarily ploughed.				Plot No. 42 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Bavto ...	152	364	7 1 8	21 3 0	224	404	6 9 8	26 11 0
Castors ...	70	...	3 8 0		97	...	4 13 4	
Wál (green pods).	1,252	...	19 9 0		1,364	...	20 8 8	
„ (grain) ...	161	...	5 0 4		185	...	5 12 4	
			35 3 0				37 12 0	

Bavto and Castors failed ; while Wál gave a good outturn.

10. *Series VI.*—The object was to see the effects of ordinary and deep ploughing on the following rotation and compare it with others :—

1st year	Turia, Dudhi and Gowar.
2nd „	Kodra mixture.
3rd „	Bájri.

The following table shows the details of plots and cultivation in this series :—

Plot No.	Area in gunthas.	Crop.	Tillage.	Manure.			In rotation or continuous.	Irrigated or not.
				Kind.	Quantity per acre.	Time of application.		
48	10	Turia ... ... Dudhi ... ... Gowár, etc.	Ordinary .	Farm Yard manure.	10 tons ...	June ...	In rotation ...	Irrigated.
56	10	Do.	Deep ...	Do. ...	Do. ...	Do. ...	Do. ...	Do.
49	10	Kodra and mixture .	Ordinary ...	*Nil* ...	*Nil* ...	...	Do. ...	*Nil.*
57	10	Do. ...	Deep ...	*Nil* ...	*Nil* ...	...	Do. ...	*Nil.*
50	10	Bájri ...	Ordinary ...	*Nil* ...	*Nil* ...	...	Do. ...	*Nil.*
58	10	Do. ...	Deep ...	*Nil* ...	*Nil* ...	..	Do. ...	*Nil.*

The results of Turia, Dudhi, etc., are as under :—

Crop.	Plot No. 48 ordinarily ploughed.			Plot No. 56 deeply ploughed.		
	Yield per acre. Green vegetable.	Value of produce.	Cost of cultivation.	Yield per acre. Green vegetable.	Value of produce.	Cost of cultivation.
	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Rs. a. p.	Rs. a. p.
Turia ...	2,793	31 10 4	104 8 4	3,670	41 8 0	103 5 4
Pumpkins ...	1,844	27 8 8		1,818	27 2 4	
Gowár pods ..	852	18 13 4		498	10 8 0	
Dudhi ...	228	5 13 0		314	6 5 8	
Raddish ...	16,894	48 0 4		19,256	54 11 8	
		131 13 8			140 3 8	

A large quantity of Turia and Pumpkins became rotten owing to the heavy rains.

The results of Kodra and mixture are as under :—

Crop.	Plot No. 49 ordinarily ploughed.				Plot No. 57 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Kodra ..	...	620	1 3 8	14 11 8	...	948	1 14 4	16 7 8
Tal ...	25	...	3 0 4		68	...	8 1 0	
Tur ...	292	496	15 9 8		168	352	9 1 8	
Sheria ...	3	Fibre ½	0 2 6		...	...	......	
			20 0 2				19 1 0	

In this series Tur gave a good yield.

The results of Bájri are as under :—

Crop.	Plot No. 50 ordinarily ploughed.				Plot No. 58 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Bájri ...	384	2,818	35 3 0	12 8 0	458	3,504	41 0 0	15 12 0

Bájri in plot No. 58 was a 6-anna crop.

This is the highest yield of the season obtained on the Farm.

11. *Series VII.*—The object was to see the effects of deep and ordinary ploughing on the following rotations :—

1st year	(*a*) Bájri.
	(*b*) Wheat.
2nd „	Kodra and mixture.

The details of plots, crops, cultivation, etc., are as under :—

Plot No.	Area in gunthas.	Crop.	Tillage.	Manure.			In rotation or continuous.	Irrigated or not.
				Kind.	Quantity per acre.	Time of application.		
52	10	(*a*) Bájri ...	Ordinary ...	Farm Yard Manure.	10 tons ...	June ..	In rotation ...	*Nil.*
		(*b*) Wheat...	Do. ...	*Nil* ...	*Nil* ..	......	Do. ..	Irrigated.
60	10	Do. ...	Deep ...	Do. ...	Do. ...	June ...	Do. ...	Do.
51	10	Kodra and mixture.	Ordinary ..	*Nil* ...	*Nil* ...	......	Do. ...	*Nil.*
59	10	Do. ...	Deep ...	*Nil* ...	*Nil* ...	......	Do. ...	*Nil.*

The results of Bájri and Wheat are as under :—

Crop.	Plot No. 52 ordinarily ploughed.				Plot No. 60 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
(*a*) Bájri	54	864	8 0 8	29 12 8	60	1,236	9 15 4	31 3 8
(*b*) Wheat	852	1,314	31 9 0	81 6 0	1,008	1,732	41 2 8	81 6 0

Wheat was much damaged by white ants,

The crop in plot No. 52 was a 8½-anna crop and in plot No. 60, 10-anna crop.

The results of Kodra and mixture are as under :—

Crop.	Plot No. 51 ordinarily ploughed.				Plot No. 59 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Kodra	...	88	0 2 8	13 7 8	...	288	0 9 8	15 3 8
Tal	19	...	2 4 0		52	...	6 5 8	
Tur	80	200	4 6 4		240	432	12 14 0	
Sheria	...	...	......		...	...	......	
			6 13 0				19 13 4	

12. *Series VIII.*—The object was—

(1) To compare the effects of farm yard manure + castor-cake with green manure of San.

(2) To compare the effects of deep ploughing.

(3) To compare the effects of taking 3 crops in a year with those of taking the same crops in two years.

The details of plots, crops, and treatment are as under :—

Plot No.	Area in gunthás.	Crop.	Tillage.	Manure.			In rotation or continuous.	Irrigated or not.
				Kind.	Quantity per acre.	Time of application.		
61	10	Bájri ...	......	Farm Yard Manure.	June ...	10 tons ...	......	Nil.
		Potatoes ...	Ordinary ...	Castor-cake ...	December.	800 lbs. ...	Continuous ...	Irrigated.
		Sundhia ...	......	*Nil* ...	...	......	......	Do.
71	10	Do. ...	Deep ...	Do. ...	Do. ...	Do. ...	Do. ...	Do.
62	10	Bájri ...	Ordinary ...	*Nil* ...	*Nil* ...	......	In rotation, 1st year Bájri, 2nd year Potatoes and Sundhia.	*Nil.*
72	10	Do. ...	Deep ...	*Nil* ...	*Nil* ...	......		*Nil.*
63	10	Potatoes ...	Ordinary ...	Green manure of San.				Irrigated.
		and Sundhia ...	......	*Nil* ...	...	......		Do.
73	10	Do. ...	Deep ..	Do. ...	Do.	......		Do.
64	10	Bájri ...	Ordinary ...	Farm Yard Manure.	10 tons ...	June ...	In rotation, 1st year Bájri, 2nd year Potatoes and Sundhia.	*Nil.*
74	10	Do. ...	Deep ...	Do. ...	Do. ...	Do. ...		*Nil.*
65	10	Potatoes ...	Ordinary ...	Castor-cake ...	800 lbs. ...	December ...		Irrigated.
		and Sundhia ...	......	*Nil* ...	*Nil* ...	......		Do.
75	10	Do. ...	Deep ...	Do. ...	Do. ...	Do. ...		Do.

The results of Bájri, Potatoes and Sundhia are as under:—

Crop.	Plot No. 61 ordinarily ploughed.				Plot No. 71 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Bájri	446	1,872	35 6 8	29 6 0	430	2,212	34 8 8	33 7 4
Potatoes	3,656	...	75 4 0	146 6 8	4,308	...	87 8 0	146 6 8
Sundhia	...	10,384	103 13 4	46 0 4	...	9,936	99 5 8	38 6 4

The results of Bájri grown in rotation with Potatoes and Sundhia manured with green manure of San are as under:—

Crop.	Plot No. 62 ordinarily ploughed.				Plot No. 72 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Bájri	228	1,484	22 8 4	12 13 4	368	2,440	31 5 8	14 7 4

Bájri was a 2-anna crop in No. 62 and 3-anna in No. 72.

The results of Potatoes and Sundhia manured with green manure of San and grown in rotation with the above plot:—

Crop.	Plot No. 63 ordinarily ploughed.				Plot No. 73 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Potatoes	4,860	...	98 11 8	143 7 4	6,920	...	140 9 0	114 13 4
Sundhia	...	12,432	124 5 0	41 9 8	...	13,448	134 7 8	40 4 4

The results of Bájri grown in rotation with Potatoes and Sundhia manured with farm yard manure and castor-cake are as under:—

Crop.	Plot No 64 ordinarily ploughed.				Plot No. 74 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Bájri	362	1,836	28 13 4	31 2 0	274	1,504	22 6 0	33 6 0

The results of Potatoes and Sundhia grown in rotation with the above plot are as under :—

Crop.	Plot No. 65 ordinarily ploughed.				Plot No. 75 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Potatoes	5,780	...	117 0 0	153 1 8	6,550	..	133 4 0	152 14 8
Sandhia	...	11,292	112 14 8	44 7 8	...	12,044	120 7 0	40 7 4

The Bajri in plots Nos. 61 and 71 is a 5½-anna crop. Other plots gave less outturn. The highest yield of Potatoes obtained is only 8 annas. Deep ploughing has good results in all plots. Constant irrigation in the same plot without heavy manuring is not successful. The cost of cultivation is greater owing to the high price paid for the seed potatoes. The Potato crop was affected with blight.

13. *Series IX.*—The object was to compare the effects of deep and ordinary ploughing on the following crops and rotations and to compare Rozi Cotton with Broach Cotton.

(*a*)	1st year	Kodra and mixture.
	2nd year	Bajri and mixture.
	3rd year	Broach Cotton.
(*b*)	1st year	Kodra and mixture and Rozi Cotton.
	2nd year	Bajri mixture and Rozi Cotton.

The details of plots and crops, cultivation, etc., are noted below :—

Plot No.	Area in gunthas.	Crops.	Tillage.	Manure.			In rotation or continuous.	Irrigated or not.
				Kind.	Quantity per acre.	Time of application		
67	10	Kodra and mixture.	Ordinary ...	*Nil* ...	*Nil* ...	...	In rotation.	*Nil* .
77	10	Do.	Deep ...	*Nil* ...	*Nil* ...	...	Do. ...	*Nil.*
68	10	Bájri and mixture.	Ordinary ...	*Nil* ...	*Nil* ...	...	Do. ...	*Nil.*
78	10	Do.	Deep ...	*Nil* ...	*Nil* ...	...	Do. ...	*Nil.*
66	10	Cotton (Broach)	Ordinary ...	Farm yard. manure.	5 tons ...	June ...	Do. ..	*Nil.*
76	10	Do. ...	Deep ...	Do.	Do ...	Do. ...	Do. ...	*Nil.*
69	10	Kodra mixture and Rozi Cotton.	Ordinary ...	*Nil* ...	*Nil* ...	...	Do. ...	*Nil.*
79	10	Do.	Deep ...	*Nil* ...	*Nil* ...	...	Do. ...	*Nil.*
70	10	Bájri mixture and Rozi Cotton.	Ordinary ...	Farm yard manure.	5 tons ...	June ...	Do. ...	*Nil.*
80	10	Do.	Deep ...	Do.	Do. ...	Do. ...	Do. ...	*Nil.*

The results of Kodra and mixture are as under :—

Crop.	Plot No. 67 ordinarily ploughed.				Plot No. 77 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Kodra...	360	2,404	16 1 0	15 9 4	80	1,004	4 8 0	18 1 4
Tal	...	...	...		...	...	...	
Tur	1	6	0 1 0		14	80	0 13 8	
Sheria...	2	Fibre, lb. 1	0 2 4		...	...	...	
			16 4 4				5 5 8	

Kodra in plot No. 67 is a 3-anna crop. This is the highest yield of the season.

The results of Bajri and mixture are as under :—

Crop.	Plot No. 68 ordinarily ploughed.				Plot No. 78 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Bajri	240	1,400	22 11 8	13 3 0	58	760	8 13 4	16 15 0
Math	62	224	2 13 8		116	352	5 4 4	
Mag	44	160	2 0 8		64	192	3 0 0	
Tur	9	32	0 8 0		28	144	1 13 4	
			28 2 0				18 15 0	

The results of Broach Cotton are as under :—

Crop.	Plot No. 66 ordinarily ploughed.				Plot No. 76 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Broach Cotton	31	...	1 12 0	22 3 8	32	...	1 12 8	24 11 8

Cotton totally failed owing to heavy rains. The results of Kodra and mixture with Rozi Cotton are as under :—

Crop.	Plot No. 69 ordinarily ploughed.				Plot No. 79 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Kodra	...	144	0 4 8	22 7 8	...	64	0 2 0	24 15 8
Tal	9	...	1 2 0		7	...	0 13 4	
Tur	24	88	1 5 8		10	32	0 9 0	
Sheria	...	...	...		...	...	...	
Rozi Cotton...	663	...	37 4 8		704	...	39 9 8	
			40 1 1				41 2 0	

The results of Bájri and mixture with Rozi Cotton are as under :—

Crop.	Plot No. 70 ordinarily ploughed.				Plot No. 80 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Bájri	2	144	1 10 0	33 2 4	2	164	1 12 8	35 10 4
Mag	20	112	1 0 8		14	72	0 11 4	
Math	48	144	2 2 4		52	192	2 6 4	
Tur	4	12	0 3 4		8	28	0 7 4	
Rozi cotton	724	...	40 11 8		677	...	33 1 4	
			45 12 0				43 7 0	

Both Bájri and Kodra mixture failed. But Rozi Cotton gave the best results. This is the highest outturn on record. The Rozi Cotton being a second year crop got the full advantage of the heavy rains. It grew luxuriantly and smothered the crops of Bájri and Kodra.

14. *Series X.*—The object was to see whether Tal and Tur when grown mixed are more profitable than when grown separately.

The following are the results :—

Plot No.	Area in gunthás.	Crop.	Tillage.	Manure.	Yield per acre.		Value of produce.	Cost of cultivation
					Grain.	Straw.		
					Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
83	10	Tal	Ordinary ...	*Nil* ...	*Nil*	*Nil*	...	7 6 0
84	10	Tur	Do. ...	*Nil* ...	104	304	5 12 8	7 15 0
85	20	Tal	Do. ...	*Nil* ...	9	...	1 1 8	9 1 10
86		Tur	Do. ..	*Nil* ...	232	550	1 13 0	

15. *Series XI.*—The object was to investigate the theory of rotation. Tobacco and Bajri are the crops experimented with. All the plots mentioned below receive 20 cart-loads of farm yard manure every second year. This is always applied to Tobacco when this crop is grown on the plot. The following are the details :—

Plot No.	Area in gunthas.	Crop.	Tillage.	Manure.			In rotation or continuous.	Irrigated or not.
				Kind.	Quantity per acre.	Time of application.		
108	10	Bajri	Ordinary ...	*Nil* ...	*Nil* ...	...	In rotation.	*Nil.*
109	10	Tobacco	Do. ...	Farm yard manure.	10 Tons ...	June ...		*Nil.*
110	10	Do. ...	Do. ...	*Nil* ...	*Nil* ...	...	Continuous.	*Nil.*
111	10	Do. ...	Do. ...	*Nil* ...	*Nil* ...	...		*Nil.*
112	10	Do. ...	Do. ...	*Nil* ...	*Nil* ...	...		*Nil.*
113	10	Do. ...	Do. ...	*Nil* ...	*Nil* ...	...		*Nil.*
114	10	Fallow	Do. ...	*Nil* ...	*Nil* ...	...	In rotation.	*Nil.*
115	10	Bajri	Do. ...	Farm yard manure.	10 Tons ...	June ...		*Nil.*
116	10	Fallow	Do. ...	*Nil* ...	*Nil* ...	...	Do.	*Nil.*
117	10	Tobacco ...	Do. ...	Farm yard manure.	10 Tons ...	June ...		*Nil.*
118	10	Bajri	Do. ...	*Nil* ...	*Nil* ...	...	Continuous	*Nil.*
119	10	Do. ...	Do. ...	*Nil* ...	*Nil* ...	...	Do.	*Nil.*
120	10	Do. ...	Do. ...	*Nil* ...	*Nil* ...	...	Do.	*Nil.*
121	10	Do. ...	Do. ...	*Nil* ...	*Nil* ...	...	Do.	*Nil.*

The results of Bájri are as under :—

Plot No.	Crop.	Manure.	Yield per acre.		Value of produce.			Cost of cultivation.			Remarks.
			Grain.	Straw.							
			Lbs.	Lbs.	Rs.	a.	p.	Rs.	a.	p.	
108	Bájri ...	*Nil* ...	132	620	14	5	0	12	13	4	In rotation with Tobacco.
115	Do. ...	Farm yard manure.	160	2,292	20	10	0	32	5	4	In rotation with Fallow.
118	Do. ...	*Nil* ...	216	832	18	8	8	15	3	0	Continuous.
119	Do. ...	*Nil* ...	114	636	10	12	8	14	5	0	Do.
120	Do. ...	*Nil* ...	66	552	8	14	4	13	7	0	Do.
121	Do. ...	*Nil* ...	68	480	7	6	4	13	1	0	Do.

Tobacco could not be planted owing to the failure of late rains.

Experiments on crops grown continuously.

16. The object was—

(1) To see how long the following crops can be grown profitably without any manure on the same plots.

(2) To see the effects of deep and ordinary ploughing on Kodra mixture and on Bájri mixture grown continuously.

The following crops were grown continuously :—

(*a*) Bájri and mixture.
(*b*) Kodra and mixture.
(*c*) Bájri.
(*d*) Cotton, Broach.
(*e*) Tobacco (dry).

The Bájri and Kodra mixtures were grown on the following plots :—

Plot No. 137.—Area 5 gunthás, ordinarily ploughed, not manured, sown with Bájri and mixture.

Plot No. 139.—Area 5 gunthás, ordinarily ploughed, not manured, sown with Kodra and mixture.

Plot Nos. 138, 140.—Area 5 gunthás, deeply ploughed, otherwise crops and treatment same as in plots 137 and 139, respectively.

The results of Bájri and mixture are as under :—

Crop.	Plot No. 137 ordinarily ploughed.				Plot No. 138 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Bájri	52	1,012	14 14 0	18 15 4	124	1,983	15 12 0	20 7 4
Math	34	114	1 9 4		20	80	0 14 8	
Mag	40	152	1 14 8		24	93	1 2 0	
Tur	...	...	......		2	10	0 2 0	
			18 6 0				17 14 8	

The results of Kodra and mixture are as under :—

Crop.	Plot No. 139 ordinarily ploughed.				Plot No. 140 deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Kodra	104	504	4 4 0	14 7 4	68	416	2 15 4	16 15 4
Tal	1	...	0 2 0		1	...	0 2 0	
Tur	...	...	......		...	...	......	
Sheria	34	Fibre, lbs. 10	2 2 0		26	19	1 12 0	
			6 8 0				4 13 4	

Cotton, Bájri and Tobacco were grown on the following plots :—

Plot No. 97.—Area 6 gunthás, ordinarily ploughed, not manured, sown with Broach Cotton.

Plot No. 98.—Area 6 gunthás, ordinarily ploughed, not manured, sown with Bájri.

The results are as under :—

Plot No.	Crop.	Manure.	Yield per acre.		Value of produce.	Cost of cultivation.
			Grain.	Straw.		
			Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
97	Cotton	*Nil* ...	33	...	1 13 8	15 1 1
98	Bájri	*Nil* ...	356	1,566	29 2 3	19 3 10

Cultural experiments.

17. *Series I.*—The object was—

(1) To compare Bájri and Bájro sown 1′ apart with Bájri and Bájro sown 1½′ apart.

(2) To compare the yield of Bájri with that of Bájro.

(3) To compare Broach Cotton sown 1½′ apart with Cotton sown 2′ apart.

Bájri and Bájro were grown in the following plots :—

Plot No. 102.—Area 10 gunthás, ordinarily ploughed, not manured, and sown with Bájri 1′ apart.

Plot No. 103.—Area 10 gunthás, ordinarily ploughed, not manured, sown with Bájro 1′ apart.

Plot No. 106.—Area 10 gunthás, ordinarily ploughed, not manured, sown with Bájri 1½′ apart.

Plot No. 107.—Area 10 gunthás, ordinarily ploughed, not manured, sown with Bájro 1½′ apart.

The results of Bájri and Bájro are as under :—

Plot. No.	Crop.	Treatment.	Yield per acre.		Value of produce.	Cost of cultivation.
			Grain.	Straw.		
			Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
102	Bájri ...	Sown 1′ apart ...	144	1,040	14 1 0	14 6 4
106	Do. ..	Do. 1½′ do. ...	166	856	15 4 0	12 12 0
103	Bájro ...	Do. 1′ do. ...	96	712	12 0 4	13 3 4
107	Do. ...	Do. 1½′ do. ...	60	628	8 12 0	11 10 0

Cotton was sown under similar conditions in the following plots :—

Plot Nos. 104, 105.—Area 10 gunthás each, ordinarily ploughed, not manured, and sown with Broach Cotton 1½′ apart.

Plot Nos. 122-A, 122-B.—Area 8½ gunthás each, ordinarily ploughed, not manured, sown with Broach Cotton 2′ apart.

Owing to heavy and constant rain in the early stage and absence of late rains, the Cotton crop proved a total failure.

18. *Series II.*—The object was to compare Bájri and Gowar sown as separate crops with Bájri and Gowar sown mixed together :—

Plot No. 126.—Area 20 gunthás, ordinarily ploughed, not manured, sown with Bajri.

Plot No. 127.—Area 20 gunthás, ordinarily ploughed, not manured, sown with Bajri and Gowar.

Plot No. 128.—Area 20 gunthás, ordinarily ploughed, not manured, sown with Gowar.

The results are as under :—

Plot No.	Crop.	Manure.	Yield per acre.		Value of produce.	Cost of cultivation.
			Grain.	Straw.		
			Lbs.	Lbs.	Rs. a p.	Rs. a. p.
126	Bájri	*Nil* ...	64	1,138	11 9 6	9 8 2
127	Bájri	*Nil* ...	64	1,274	11 15 2	15 4 8
	+					
	Gowar	*Nil* ...	70	106	3 0 10	
128	Gowar	*Nil* ...	143	130	6 1 2	12 3 10

Trial of new crops.

19. *Cottons.*—The object was—

(1) To introduce Lalio and Wagad Cottons which are extensively grown in Ahmedabad District.

The results are as under :—

Plot No.	Area in gunthás.	Crop.	Tillage.	Manure.	Irrigation or not.	Yield of seed cotton per acre.	Value of produce.	Cost of cultivation.
						Lbs.	Rs. a. p.	Rs. a. p.
123	20	Wagad ...	Ordinary ...	*Nil* ...	*Nil* ...	41	2 7 6	12 1 8
124 125	40	Lalio ..	Do. ...	*Nil* ...	*Nil* ...	114	6 6 7	11 15 5

The crop totally failed owing to unfavourable season.

20. *Bájri.*—West African ; the newly introduced variety of Bájri was again tried during this year. The grain is smaller and yellowish, but the ears are very long and closely grained.

The following are the results :—

Plot No.	Area in gunthas.	Crop.	Tillage.	Manure.	Yield per acre.		Value of produce.	Cost of cultivation.
					Grain.	Straw.		
					Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
96	10	West African.	Ordinary ...	*Nil* ...	456	4,480	39 6 0	22 4 4

The crop was a 6-anna crop.

21. *Rice.*—Two American and three Japanese varieties of rice were tried on a small scale. The statement gives full details.

No.	Name of crop and variety.	Kind of soil in which sown.	Preparatory tillage.	Manure applied.	Area sown.	Date of sowing.	Quantity of seed sown.	Character of the season.	Field operations after sowing, such as watering, weeding, hoeing, etc.	Date of harvesting.	Out-turn per acre.	Value of out-turn at market rates.	Remarks as to the success or failure of the trial and the reason thereof. A comparison with the local variety of the crop. Any unusual conditions of growth and any other remarks of interest.
					Sq. ft.						Lbs.	Rs. a. p.	
1	Low land Rice.	In black soil.	Before transplanting, the land was ploughed up and samared.	Farm yard manure, lbs. 15,000 per acre.	168	1st August 1907.	Seedlings transplanted 8" apart.	Season not favourable. There was no rain after the 29th August 1907.	One weeding on 23rd September and three waterings on the 24th September, 10th October and 23rd October.	30th October 1907.	129	5 3 10	These two varieties require more water. The plant were taller than local variety.
2	Upland rice.	Do. ...	Do. ...	Do. ...	270	Do. ...	Do. ...	Do. ...	Do. ...	Do. ...	806	32 11 11	
3	Honeiashi .	Do. ...	Do. ...	Do. ...	297	Do. ...	Do. ...	Do. ..	One weeding on 23rd September and only one watering on 24th September.	10th October 1907.	330	13 6 6	Japanese varieties do not require much water. They may be grown on ordinary low-lying fields. The grain is coarse.
4	Oniachi ...	Do. ...	Do. ...	Do. ...	243	Do. ...	Do. ...	Do. ...	Do. ...	Do. ...	806	32 11 11	
5	Sheinriki...	Do. ...	Do. ...	Do. ...	600	Do. ...	Do. ...	Do. ...	Do. ...	Do. ...	1,379	56 0 4	

22. *Indo-China Tur.*—This kind of Tur was sown on a small area. The germination was not good. The germinated plants were afterwards destroyed by white ants. A small quantity of seed obtained is reserved for sowing next season.

23. *Jute.*—To give a trial to this crop a small area was sown with Jute seed. The crop was sown very late in the beginning of September, as it could not be sown earlier, owing to heavy rains. The crop was required to be watered twice, owing to the failure of late rains. The height of the plant was 5 feet 3 inches. Owing to the abnormal season the growth was not vigorous.

The following are the results:—

Crop.	Dry stalks per acre.	Fibre per acre.	Percentage of dry stalks to fibre.
	Lbs.	Lbs.	
Jute	736	88	11·96

24. *Tobacco.*—The following varieties of Tobacco were grown on a small area:—

1. Talaon.
2. Havana.
3. Java, P.
4. Wlingi.
5. Spanish.
6. Florida.
7. Java, D.
8. Sumatra.

All of these grew well. The leaves of all these varieties were cured under shade.

Foreign Cottons.

25. It was found in previous years that the foreign varieties of cotton, such as Sea-Island, Texas big boll, etc., do not flourish well here. The bolls of these varieties do not fully develop and open well. These defects have been removed by crossing these varieties with tree cottons. Such crosses will be grown on a large scale next year.

Miscellaneous Experiments.

26. *San.*—This year again San was sown for fibre and seed. The plants did not grow vigorously, owing to heavy rains. In comparison with San, Sheria or Ambadi was sown. The growth was quite stunted. The plants did not grow taller than three feet.

The following are the results :—

Plot No.	Area in gunthas.	Crop.	Yield per acre.		Percentage of dry stalks to fibre.	Value of produce.	Cost of cultivation.
			Grain.	Fibre.			
			Lbs.	Lbs.		Rs. a. p.	Rs. a. p.
131	6	San	560	226	9·3	37 15 8	49 4 10
131	6	Sheria	113	46	15·2	8 6 3	25 15 3

Pests.

27. *Caterpillars.*—The crops of Tobacco and Tal were attacked with caterpillars. The attack on Tobacco was slight, but that on Tal was severe.

28. *Katras or hairy caterpillars.*—In the beginning of July, katras were seen attacking the San crop. No damage was done.

29. *White ants.*—Owing to the sandy nature of the soil, white ants were very disastrous. Wheat and Groundnut, etc., were damaged to a very great extent.

30. *Bangdi Blight.*—Several plants of Potatoes were attacked with this blight. The attacked plants were removed and burnt.

Preventive Experiments.

31. *Groundnut.*—The object was to treat the plots as a protection against white ants.

Four plots, each one guntha in area, were put under Groundnut as under :—

(1) To be treated with kerosene.
(2) To be treated with castor-cake.
(3) To be treated with ammonium sulphate.
(4) Untreated.

The results obtained are not conclusive.

Irrigational Experiments.

32. It was found in previous experiments that with the same quantity of water a larger area is irrigated by the engine and pump

than by the kos. To test this assertion two plots were put under Variáli. One was watered with the kos and the other with the pump and engine. The following table gives the details :—

Plot No.	Crop.	Lift used.	Total number of waterings.	Quantity of water applied.	Yield per acre.	Value of produce.	Remarks.
				Gals.	Lbs.	Rs. a. p.	
81	Variáli ...	Pump ...	7	218,400	1,784	215 9 0	
82	Do. ...	Kos ...	7	268,724	1,471	177 12 0	Several plants in the middle portion rotted during the heavy rains.

While irrigating with a kos, the quantity of water required is more; this can be accounted for by two reasons :—

(1) Slowness of the current.
(2) The whole of the water raised by the kos is not recovered; some falls back into the well and some remains in the kos.

The following table gives the details of the quantity of water taken by several crops per acre during the year under report :—

No.	Crop.	Quantity of water at the time of sowing, in gallons.	Quantity of water at the first watering, in gallons.	Quantity of water at the second watering, in gallons.	Total number of waterings.	Total quantity of water applied.		Rainfall during the period.	Total quantity of water in inches of rainfall.
						In gallons.	In inches of rainfall.		
							Inches.	Inches.	Inches.
1	Tobacco	61,236	48,076	42,100	5	217,436	9·00	0·13	9·13
2	Variáli	*Nil*	58,724	48,148	9	331,748	11·80	24·81	39·61
3	Rice	*Nil*	158,247	113,027	2	271,864	12·13	37·06	49·19
4	Jiru	47,276	26,052	32,348	3	107,676	4·72	0·13	4·85
5	Potatoes	43,764	28,376	30,000	8	253,888	11·32	0·13	11·45
6	Onions	46,724	33,024	48,376	14	531,124	23·68	0·13	23·81

New Implements.

33. No new implements were tried during the year under report.

Tobacco Curing.

34. This year Tobacco curing on improved methods was tried on a small scale. This method chiefly consists in drying Tobacco

slowly under shade. Further details of this method cannot be published at this early stage. The results obtained were encouraging. The samples were sent to Bombay for valuation. A good sample was valued at 5 annas per lb. exclusive of duty. The value of country-cured tobacco varies from 1 to 1½ annas per lb.

The following is an extract from the letter received from the Star Tobacco Company, Bombay:—

> "We have the honor to acknowledge receipt of your letter No. 271, dated 19th instant, enclosing a parcel receipt for 20 samples of tobacco which we have examined and find that Nos. 1, 2, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15 and 17 are suitable for our purpose, although they have not the same test as the imported tobacco. Still we believe that the samples you have sent are quite satisfactory and can easily command a good sale here. We offer 4 to 5 annas for sample No. 6 and 2 to 3 annas for the rest per lb., free delivery at Bandora station. We shall be pleased to take up the whole quantity you may have."

Experiments made off the Station.

35. To demonstrate the use of fertilizers a few experiments on Rice and Tobacco were arranged in the cultivators' fields.

The following table gives the details of Rice experiments :—

Number.	Area.	Crop.	Manure.			Value of manure per acre.	Irrigated or not.	Yield per acre.		Value of yield per acre.	Profit or loss per acre due to manure.	Remarks.
			Kind.	Quantity.				Grain.	Fodder.			
				Per plot.	Per acre.							
	A. g.			Lbs.	Lbs.	Rs. a. p.		Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	
1	0 23	Rice ...	Ammonium Sulphate ... Basic Slag ... ... Potassium Chloride ...	26 28¾ 17¼	45 50 30	8 9 10	Irrigated once	923	929	43 7 8	−1 0 3	
	1 6	Do. ..	*Nil*	*Nil* ...	*Nil* ...	......	Do.	765	723	35 14 1	......	
2	0 35	Do. ...	Soda Nitrate ... ... Super phosphate ... ... Potassium Sulphate ...	52½ 43¾ 26¼	60 50 30	10 6 9	*Nil*	811	1,080	39 1 3	−8 6 10	
	0 35	Do. ...	*Nil*	*Nil* ...	*Nil* ...	......	*Nil*	777	926	37 1 4	......	
3	0 11	Do. ...	Ammonium Sulphate ... Potassium Chloride ...	13¾ 13¾	50 50	9 2 8	*Nil*	873	1,873	42 9 0	+10 0 1	
	0 23	Do. ...	*Nil*	*Nil* ...	*Nil* ...	......	*Nil*	487	626	23 6 3	......	
4	0 29	Do. ...	Nitre	58	80	8 14 3	Irrigated once	1,463	1,875	67 4 1	+6 14 11	
	0 29	Do. ...	*Nil*	*Nil* ...	*Nil* ...	.....	*Nil*	1,048	1,676	51 6 11	......	
5	0 24	Do. ...	Nitre ... ... Basic Slag	48 30	80 50	10 8 1	*Nil*	733	1,000	35 6 5	−15 0 11	
	0 11	Do. ...	*Nil*	*Nil* ...	*Nil* ...	......	*Nil*	873	1,091	39 15 3	......	
6	1 8	Do. ...	Ammonium Sulphate ... Basic Slag ... ... Potassium Chloride ...	54 60 36	45 50 30	8 9 10	Irrigated once	1,600	1,646	75 7 10	+19 9 4	
	1 8	Do. ...	*Nil*	*Nil* ...	*Nil* ...	.....	*Nil*	1,000	1,062½	47 4 8	......	
7	0 17	Do. ...	Ammonium Sulphate ... Basic Slag ... ... Potassium Chloride ...	19¼ 21¼ 12¾	45 50 30	8 9 10	*Nil*	753	953	36 1 11	−9 11 1	
	0 17	Do. ...	*Nil*	*Nil* ...	*Nil* ...	......	*Nil*	776	976	37 3 2	......	
8	0 18	Do. ...	Soda Nitrate ... ... Super phosphate ... ... Potassium Sulphate ...	27 22½ 13½	60 50 30	10 6 9	Irrigated once	973	1,360	47 5 1	−5 12 4	
	0 18	Do. ...	*Nil*	*Nil* ...	*Nil* ...	......	Do.	889	1,133	42 10 8	......	

Owing to the unfavourable season the results are not encouraging. There is a loss in experiments Nos. 1, 2, 5, 7, 8. The experiment No. 3 has a profit of Rs. 10-0-1. In experiment No. 4, there is a profit of Rs. 6-4-11. But the unmanured plot was not irrigated along with the manured plot. An acre of rice land this year required Rs. 15 for irrigation. If the amount of Rs. 15 be deducted from the yield of the manured plot, supposing that the irrigation has produced only the cost of irrigation, there would be a loss of Rs. 8-1-1.

After deducting the cost of irrigation the experiment No. 6 will only give a profit of Rs. 4-9-4. No definite conclusions can be drawn in an unfavourable season, and the results are only published with a view to show the necessity for further investigation.

36. The following statement gives the details of Tobacco experiments:—

Number.	Area.	Crop.	Manure.			Value of manure.	Irrigated or not.	Yield per acre in lbs.	Value of yield per acre.	Profit or loss per acre due to manure.	Remarks.
			Kind.	Quantity.							
				Per plot.	Per acre.						
	A. g.			Lbs.	Lbs.	Rs. a. p.		Lbs.	Rs. a. p.	Rs. a. p.	
1	1 0	Tobacco ...	Ammonium Sulphate. Potassium Sulphate.	50 50	50 50	9 2 8	Irrigated.	1,056	156 0 0	+9 5 4	
	1 20	Do. ...	*Nil*	*Nil.*	*Nil.*	...	Do. ...	968	137 8 0	...	
2	0 24	Do. ...	Ammonium Sulphate. Potassium Sulphate.	30 30	50 50	9 2 8	Do. ...	1,283	104 11 9	—3 9 5	
	1 32	Do. ...	*Nil*	*Nil.*	*Nil.*	...	Do. ...	1,215	99 2 11	...	
3	0 24	Do. ...	Ammonium Sulphate. Potassium Chloride.	30 30	50 50	9 2 8	Do ...	996	81 4 11	—5 10 2	
	1 26	Do. ...	*Nil*	*Nil.*	*Nil.*	...	Do. ...	952	77 11 5	...	

Tobacco in experiments 2 and 3 was spoiled by rain in January. In experiment No. 1, there is a profit of Rs. 9-5-4. Besides the owner of the field says that the Tobacco of the manured plot was stronger in flavor and it fetched four annas more per maund than that of the unmanured plot.

Fertilizers are profitably used everywhere in Europe and America, and there is no reason why they should not be so to some extent at least in India. The chief points to be investigated in the use of fertilizers are:—

(1) Kind of fertilizer required by a particular crop.
(2) Quantity.
(3) Time of application.

All these points differ according to crop, soil, water and season.

Engine and Pump.

37. The oil-engine and pump installed for irrigation purposes on this Farm are working well.

Ensilage.

38. To avoid the heavy cost of purchasing fodder when it is scarce and to provide succulent fodder in the hot weather 39,358 lbs. of green grass was put in the silo in the middle of September. The grass was purchased at that time at the rate of 400 lbs. per rupee. The silo was opened in March. The ensilage is being fed to the cattle and no actual weight can be given at present. About 30,000 lbs. of edible ensilage is expected. This is very cheap when the high prices of fodder just now prevailing (May—June) are considered. Sundhia fodder is sold here at 50 lbs. per rupee.

The following is the analysis of a sample of this silage recently made by the Agricultural Chemist.

	Silage percentage.
Moisture	67·12
Soluble mineral matter	1·91
Eather extract	·71
Soluble albuminoids	1·19
Insoluble albuminoids	·19
Soluble carbohydrates	17·53
Woody fibre	9·59
Insoluble matter and sand	1·76
	100·00
Total nitrogen	·373
Albuminoid nitrogen	·220
Acetic acid	·192
Lactic acid	1·008

A fairly normal sample of sour silage in good condition.

39. The Superintendent, Mr. D. H. Tagare, was, in addition to his own duties, in charge of the Surat Farm for three months. He was travelling constantly from September to March. The Superintendent was also in charge of the operations of collections and distributing cotton-seed in Ahmedabad District. He had also arranged to import 12,000 lbs. of Navsári cotton-seed and to distribute it to the cultivators in Bavla. He was specially called

to Nandurbár to give advice on the working of an oil-engine purchased by a cultivator, who was unable to make it work satisfactorily. Mr. Tagare was able to put matters right.

40. The following statements will be found in the form of appendices:—

Appendix A.—Analysis of manures.
,, B.—Analysis of irrigation water.
,, C.—Distribution of seed.
,, D.— Do. of implements.
,, E.— Do. of manures.
,, F.—Visitors.
,, G.—Statement of enquiries.
,, H.—Deterioration of agricultural population.
,, J.—Note on farm crops *versus* cultivators.

APPENDIX A.

The following statement gives the details of analysis of manures used on the farm :—

Kind of manure.	Nitrogen.	Phosphoric acid.	Potash.
	Per cent.	Per cent.	Per cent.
Farm yard manure	0·51	0·68	1·11
Castor-cake	3·50	1·60	0·82
Nitre	15·78	...	43·90
Sodium nitrate	15·99	...	...
Ammonium sulphate	20·82	...	...

APPENDIX B.

The following statement gives the details of analysis of the water of the farm well :—

Ingredients.	Parts per 100,000.
	Per cent.
Sodium nitrate	11·11
Potassium chloride	7·98
Sodium chloride	60·17
Calcium carbonate	10·00
Magnesium carbonate	27·27
Sodium carbonate	10·41
Sodium sulphate	9·13

APPENDIX C.

The following statement shows the details of seed distributed :—

Seeds.

Name of article.	Quantity in lbs.	Places where distributed.
Bajri	83	Ellore, Mirpurkhas, Dhulia, Násik, Ahmedabad, Partabgarh, Poona, Undach and Calcutta.
Bajri, Jambusari ...	40	Sangamner.
Bajri	42	Mirpurkhas and Calcutta.
Bulrush Millet ...	1½	Poona and Nadiád.
Jowar, Sundhia ...	4,770	Poona, Malegaum, Chharodi, Sángali, Oorghalli, Trichinopally, and Hebli.
Do. Dadia ...	3	Surat and Calcutta.
Do. Farfaria ..	3	Do.
Paddy, Kamod ...	24	Ellore, Surat, Pusa and Calcutta.
Do. Elaychi ...	4	Surat and Calcutta.
Do. Sukhvel ...	800	Calcutta and Bankipore.
Do. Sutarsal ...	2	Calcutta.
Do. Jirasal ..	17	Pusa and Calcutta.
Do. Amba Mohor ...	15	Pusa.
Do. Wanklo ...	2	Calcutta.
Do. Sathi ...	2	Do.
Do. Utavali ...	2	Do.
Do. Tinpankhali ..	15	Pusa.
Do. Zini Colam ...	15	Do.
Vari	10	Do.
Paddy Pankhali ...	2	Calcutta.
Variali	2	Ellore.
Til	2	Do.
San	382	Nadiád, Nágpur and Calcutta.
Gowar	43	Poona, Násik, Ahmedabad, Oorghalli and Dhárwár.
Tobacco seed ...	¾	Gondal and Dharampore.
Cotton, Broach ...	13	Nadiád and Ahmedabad.
Do. 13-T ...	3	Dohad.
Chavli, Red ...	250½	Poona and Nágpore.
Do. white, large ...	½	Poona.
Do. white, small ...	½	Do.
Banti	100½	Poona and Nágpore.
Cabbage seed ...	$\frac{1}{16}$	Nadiád.
Brinjal seed ...	2	Ahmednagar.
Bhendi seed ...	1	Hebli.
Wal	2	Ellore.
Sava	1	Do.
Mag	1	Do.

APPENDIX C—*continued.*

Name of article.	Quantity in lbs.	Places where distributed.
Udid	1	Ellore.
Bavto	12	Ellore and Ahmedabad.
Kodra	2	Ahmedabad.
Tur	17	Ahmedabad, Dhulia, Dhárwár, Pusa and Násik.
Wheat	8	Amreli.
Sisalhemp offshoots ...	50	Nadiád.
Lucerne seed ...	1	Do.
Cai-sen	½	Dhárwár.
Cai-trang ...	½	Do.
Indigo seed ...	16	Poona.
Safflower seed ...	1½	Do.
Soy-beans ...	10	Pusa.

Cotton-seed distribution.

With a view to supply good seed to the cultivators, 24,000 lbs. of Lalio Cotton-seed was selected and distributed to the cultivators in the Ahmedabad District. Arrangements were also made to distribute 12,000 lbs. good Navsari Cotton-seed in the same district.

APPENDIX D.

The following statement shows the details of implements distributed :—

Name of article.	Number.	Places where distributed.
Hand-chaff cutters ...	17	Sanjan, Bordi, Roho, Dohad, Ahmedabad, Ránpur, Kareli, Anand, Baroda, Pátan, Hyderabad, Itola, Telwa and Ankleshwar.
Hoe-blades ...	4	Dohad.
Small T. W. plough ...	1	Nadiád.

APPENDIX E.

The following statement gives details of the manures distributed :—

Name of article.	Quantity in lbs.	Places where distributed.
Ammonium sulphate ...	433	Dabhan, Kamla and Manjipura.
Basic slag ...	140	Kamla and Manjipura.
Sodium nitrate ...	93½	Kamla and Nadiád.
Nitre ..	106	Manjipura.
Potassium chloride ...	109¼	Kamla, Manjipura and Nadiád.
Do. sulphate ...	134¾	Kamla, Nadiád and Dabhan.
Superphosphate ...	66¼	Kamla and Nadiád.

APPENDIX F.

Visitors.

The station was visited by 231 persons. The following table shows the details of visitors who visited the station during the year 1907-08 :—

	Cultivators.	Non-cultivators.	Officers.	Total.
Number of persons ...	169	50	12	231

APPENDIX G.

Statement of enquiries.

1. Generally the cultivators on this side do not make written inquiries. However, 9 written inquiries were made and all of them were answered by the Superintendent, Mr. D. H. Tagare. The enquiries were made chiefly on the following points :—

(1) Engine and pump.
(2) Cultivation of tree cottons.
(3) Cultivation of sugar-beet.
(4) Tobacco-curing on improved methods.

APPENDIX H.

Deterioration of agricultural population by Mr. D. H. Tagare, Superintendent.

This is the most important subject and the Government of India is making thorough enquiry, through the Revenue Department, to solve this problem. The Superintendent has got little opportunity to watch systematically the progress of the cultivators in several villages. The general idea is that the agricultural population is deteriorating. There are several causes, chief of which are noted below :—

(1) Poverty.
(2) Unfavorable seasons.
(3) Famine and plague.
(4) Small holdings.
(5) Increase in wages.

General poverty of the Indian agriculturists is a well-known fact. This is the chief reason why they cannot go a step further. Since the last famine, agriculture has become risky. Several cultivators cannot get what they actually spend and they are always required to go into debt. Plague has augmented this difficulty and the cultivators are losing their credit to raise a necessary loan. Owing to small holdings, all the members of the family cannot maintain themselves, and some of them are required to go elsewhere. Mill industries and other minor industries have raised the standard of wages, and it is found very difficult by the cultivators to procure labor at the time of sowing and harvesting.

APPENDIX J.

Note on the farm crops versus *cultivators.*

The following important crops were grown during the year 1907-08, but, owing to unfavorable season, the yield was very low :—

Bajri.—Total failure of the crop was reported round about. A good crop of a cultivator near the farm was about 260 lbs. per acre. A good crop on the farm was 448 lbs. per acre.

Kodra and mixture.—The crop practically yielded nothing. Several cultivators got only fodder. A very good crop on the cultivator's field was 200 lbs. per acre, while a good crop on the farm gave 360 lbs. per acre.

Bavto mixture.—Suffered the same fate. The farm crop of Bavto was 224 lbs. per acre.

Tobacco.—The yield of tobacco is also less than the last year. The best yield on the cultivator's field was 1,100 lbs. per acre. The ordinarily manured farm tobacco yielded 1,290 lbs. per acre.

Cotton.—The Rozy Cotton was a good crop everywhere. The highest yield reported from the cultivator's field is 500 lbs. per acre. The yield of Rozy Cotton on the farm was 756 lbs. Perhaps this is the highest yield of Rozy Cotton on record.

Variali.—The farm crop yielded 1,944 lbs. A good crop on the cultivator's field yielded 1,500 lbs. per acre.

Onions.—This crop did not yield heavily like last year. The farm crop yield was 6,300 lbs. It was only a 7½-anna crop. The plot in which the onions were planted was very sandy.

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ANNUAL REPORT
OF THE
EXPERIMENTAL WORK
OF THE
NADIAD AGRICULTURAL STATION
(Kaira District, Gujarát)

FOR THE YEAR

1908-1909

BY

T. FORSTER MAIN, B.Sc., ETC.,
Deputy Director of Agriculture, Bombay Presidency.

BOMBAY
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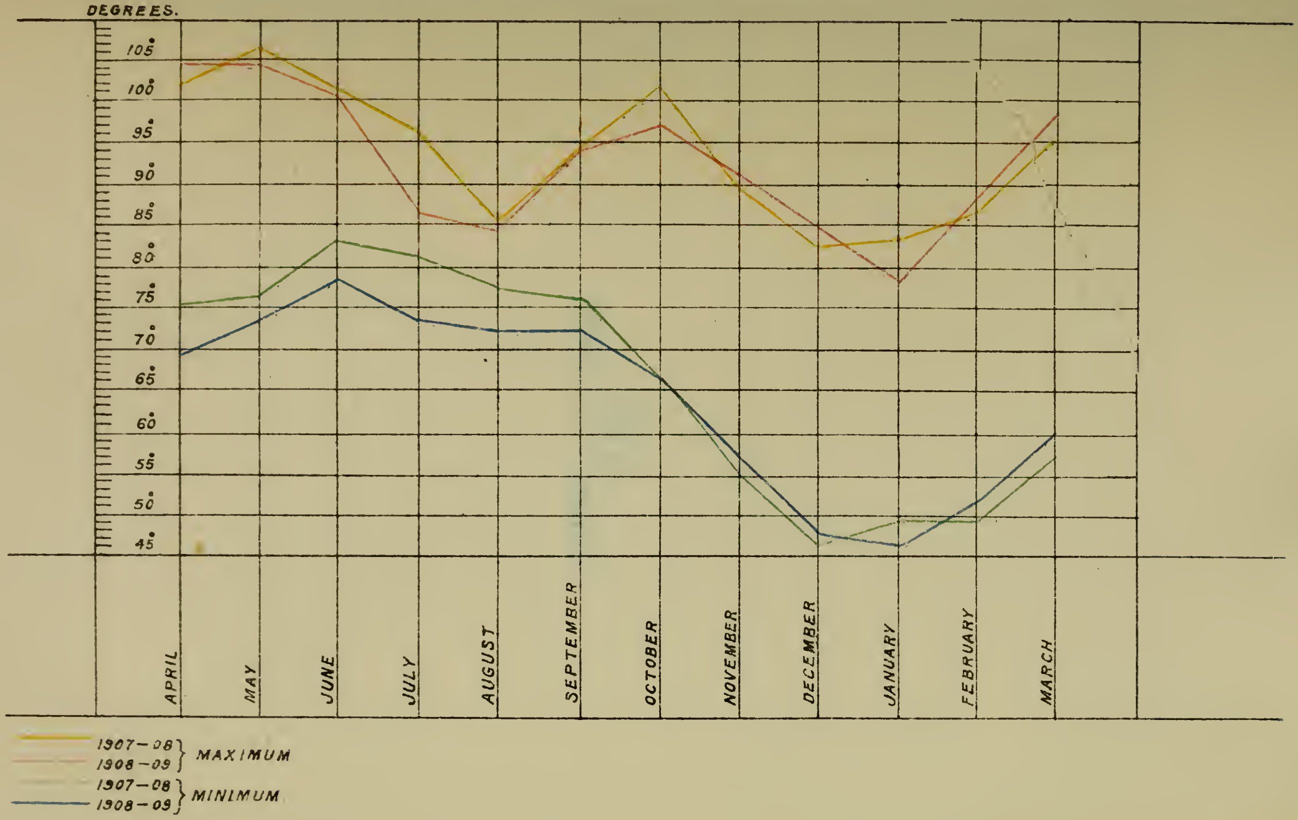

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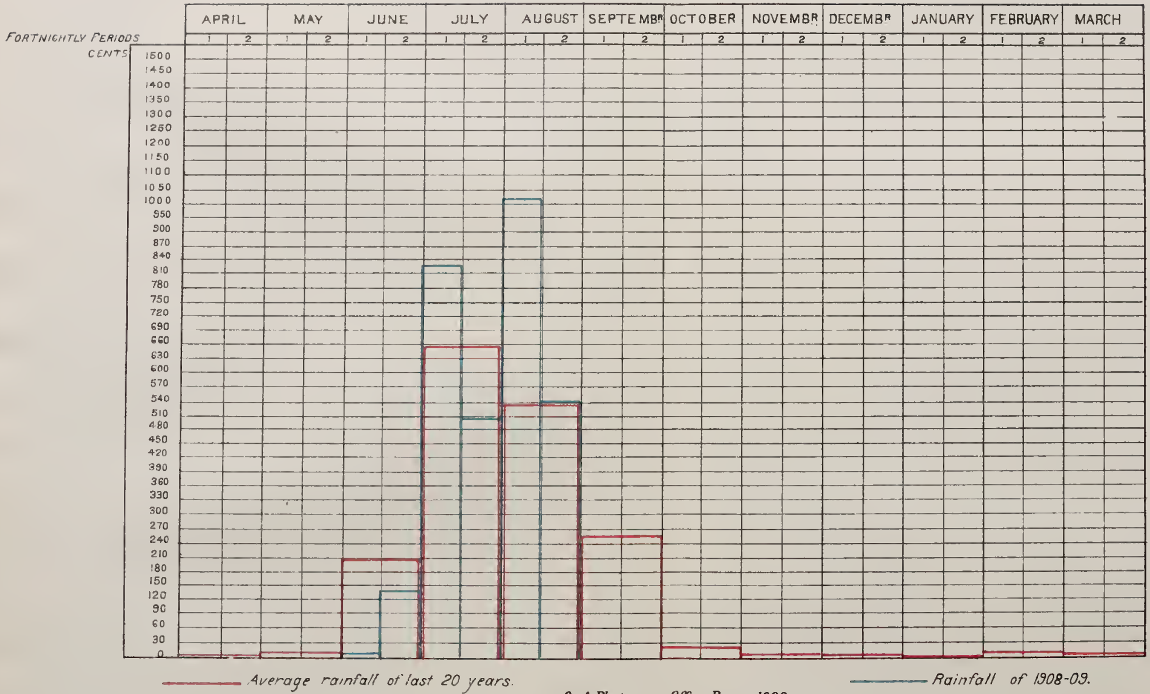

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THE NADIA'D AGRICULTURAL STATION, 1908-09.

Established—1903; *North Latitude*—22°; *East Longitude*—73·0°; *Elevation*—Approximately sea level; *Soil*—Alluvial loam (Ver. Gorádu); *Average Rainfall*—34·10″; *Temperature*—Maximum 109° in May, minimum 40° in December.

Area.—44 acres.

Superintendent.—Dattátraya Hari Tagáre.

2. *Season.*—The appended diagram and graph show the rainfall and temperature respectively during the year 1908-09 on the Nadiád Farm.

The season was similar to that of last year, in that it was unfavourable to both kharif and rabi crops. The first shower of rain fell on the 19th of June and this amounted to 1·21″, but this was barely sufficient to allow of a start being made with sowing operations; however, early crops such as bájri, kodra, tal and san were sown. The regular monsoon did not set in till the 1st July and it rained continuously for 56 days upto the 27th of August. During this time there was no opportunity to sow the fields and any seed that was sown did not germinate but rotted in the soil. During this time the fields became infested with grass and weeds which could not be removed. The early sown crops of bájri, kodra, etc., became pale and stunted and many fields had to be sown a second and third time. While fully a third of the land in the surrounding district was never sown at all. Tobacco seedlings also rotted in the seed beds. After the 27th August there was no further rain and there was soon a cry for late rain. Many of the late crops sown after the rains did not mature. Bájri and kodra produced flowers but these did not develop into good seed. All the kharif crops suffered owing to the lack of one late rain and the yield was consequently much below the average. At the end of December there was a severe frost which did great damage to the crop of cotton grown on the farm. Tur, tobacco and potatoes were also much damaged.

3. Mr. D. H. Tagáre was the Superintendent in charge of the farm throughout the year. In addition to his farm duties he acted as joint secretary with Mr. Girdhardás Mangaldás Desái in making all the arrangements for the Agricultural Show held at Nadiád in January of the present year, which was jointly organized by the Nadiád Agricultural Association and the

Agricultural Department. It was due to the excellent arrangements for sleeping and feeding the numerous delegates from all parts of the Ahmedabad and Kaira District, that the show was such a great success. It extended over a period of one week during which time it was attended by 8,000 visitors. Mr. A. L. M. Wood, Collector of Kaira, opened the show when he delivered an address upon the agricultural condition of Northern Gujarát with particular reference to the great decline in the number of Pátidár cultivators and their gradual replacement by Dharálas, who were their inferiors as agriculturists. Subsequently demonstrations and lectures were delivered by the principal members of the Departmental Staff on important agricultural matters.

4. Mr. Tagáre also organized and conducted demonstrations held at Dhabhán and Bávla where he brought to the notice of the cultivators the utility of Fertilizers such as Ammonium Sulphate, Potash, Potassium Chloride, Nitre, etc., on crops such as rice, tobacco, etc., and Turnwest plough. Details of this demonstration will be found in Appendix J of this report.

5. The arrangements for the distribution of Navsári and Lálio cotton seed in the Dholka and Daskroi Tálukas of the Ahmedabad District were also in the hands of the Superintendent. Mr. Tagáre was also present at the Dhárwár show held in March of the present year where he assisted in the demonstrations and delivered a lecture on oil engines and water raising appliances.

6. For convenience the work of the farm has been reported under the following sections :—

Section A.—Crop Experiments.
Section B.—Manurial Experiments.
Section C.—Cultural Experiments.
Section D.—Rotational Experiments.
Section E.—Seed Selection.
Section F.—Crop Pests.
Section G.—Miscellaneous.
Section H.—Experiments made off the station.

SECTION A.—CROP EXPERIMENTS.

Tobacco.

7. *Cultivation under shade.*—It has frequently been observed that tobacco grown on the Nadiád Farm from Deshi seed, produced very thick resinous leaves and this is indeed a characteristic of

the tobacco produced in the Charotar villages of Northern Gujarát. Some years ago seed of the famous wrapper producing tobaccoes was obtained from Sumatra and elsewhere with the object of seeing whether these tobaccoes would retain their high qualities when grown under the conditions which prevail in Gujarát. The varieties obtained and tested included—

Talaon.
Havanah.
Java P.
Java D.
Florida.
Sumatra.

These have now been grown for some years past and they all seem to suit the country from a purely agricultural point of view. But it was seen from the beginning that they were not retaining their reputation for producing leaves of thin texture and mild flavour, but on the contrary were gradually acquiring the character of Deshi tobacco referred to above. This is not at all surprising when it is pointed out that Nadiád has a sandy loam soil and that there is a very strong sun during the latter part of the growing season when the air becomes very dry.

8. It was therefore thought desirable to experiment with shade grown tobacco to see whether a leaf of thin texture and mild flavour could be produced in the same way as is done in some parts of America. Accordingly an area of 2 gunthas was measured off and a temporary erection made of bamboo poles was put up. This at a height of 9 feet above ground level was covered over with white cotton cloth and the sides were also covered down to the ground at a cost of Rs. 124-8-6 and most of the material will be again available for use next season.

9. Florida and Sumatra varieties were selected for trial in the experiment and each of these was planted on an area of one guntha. It soon became obvious that one effect of the shade would be to make the plants grow very much faster and attain a very much greater height than those grown in the open, which were growing close at hand for comparative purposes. The plants were intentionally not topped to allow them to produce a large number of leaves with the object of these being less well nourished and therefore thinner in texture and milder. Very little suckering was required as the plants did not produce many suckers. The tallest Florida plant attained a height of 8 feet 9 inches and produced 27 leaves, while the tallest Sumatra plant produced 26 leaves and grew 7 feet and 8½ inches in height. The tallest plant of Sumatra grown in the open and not topped, reached a height of 4½ feet and produced 13 leaves, while the tallest Florida plant grown in the open stood 5 feet 2½ inches high and produced 14 leaves.

The crop grown under shade was not watered because it was found that irrigation tended to make these tall delicate plants fall over. The crop grown in the open was watered three times as usual. All the tobacco was planted at the same time in August during the rains.

The yields of cured leaf obtained were at the following rate per acre in lbs. :—

	Florida.	Sumatra.
	Lbs.	Lbs.
Crop in shade ...	680	840
Crop in open ...	1,200	1,120

The yield of shade grown tobacco in America is said to be about 800 lbs. per acre. The shade grown leaf was extremely thin and papery to the feel.

The leaf was dried in the tobacco barn where it was found that the shade grown article took a couple of days longer to dry than that produced in the open, which dried in a week. Owing to difficulties in regulating the humidity and temperature the shade grown leaf became very brittle and difficult to handle, whereas, it ought to be very elastic and steps are now being taken to overcome these difficulties.

10. *Barn-curing.*—For the second year the tobacco produced on the farm was cured in the new barn erected for this purpose. Successful curing depends almost entirely upon the proper regulation of the temperature and humidity of the air in the barn at different stages of the work. It has been found a matter of some difficulty to control these factors; but it is hoped, before next season, to be able to make arrangements for their more effective control.

11. The curing process consists of the following operations :—

(1) *Drying the leaf.*—As soon as the plants have been cut in the field these are tied in pairs and hung over either side of the bamboo rods which are stretched across the curing barn in three tiers. The barn should be completely filled up within two or three days.

The leaves soon begin to evaporate their moisture and the rate at which this process proceeds naturally depends upon the humidity in the air. In too dry air the drying proceeds too rapidly which causes the leaf to assume a fixed semi-green appearance which is very objectionable. When the air contains too much moisture, on the other hand, the drying process is delayed and the leaf becomes musty and dark in colour.

Normally the leaf becomes yellow after about a week and in another 4 days the leaf has assumed a brown appearance. The plants are kept hanging in the barn till the midrib gets dry which takes about 40 days.

(2) The leaves are now stripped off the stalk and made into small "hands" containing 20 to 25 leaves each. These "hands" are next built into heaps of about 3′ in diameter, but these would be made larger provided there were enough "hands". The heap is then covered with a cloth both on the top and the sides, and weighed down by putting weights on the top. At first a considerable heat is developed and it is found necessary to take down the heap and build it up again daily for the first 4 or 5 days; after that the intervals become longer. The process continues until no appreciable heat is developed which takes about a fortnight from the beginning of the operation. These two processes are technically called "drying" and "sweating".

Specimens of the barn-cured leaf were sent to the Imperial Institute, London, and also to two Indian firms for favour of valuation and report.

Cotton.

12. *Exotics.*—American, Egyptian, Bourbon and Sea Island cottons have been under experiment for some years on this farm. With the exception of Bourbon however it has been found that all these cottons develop defects when grown under the conditions which prevail in Northern Gujarát. The chief of these is the improper opening of the bolls which results in the fibre not ripening properly and therefore becoming brittle and weak.

13. Experiments have therefore been carried on to see whether this defect could be overcome and the results obtained up to the present are encouraging.

Hybrids have been obtained between Bourbon and each of these cottons, and careful selection, carried on for the last two or three years, has resulted in a few hybrids combining the good qualities of American or Egyptian varieties with the proper opening of the bolls associated with Bourbon cotton. Bourbon cotton gives a ginning percentage of about 25 to 30 per cent., while Egyptian

(Abassi) gives about 33 per cent., and American (Texas) gives 35 to 40 per cent., while Sea Island gives less than 20 per cent.

The following statement summarizes the results obtained with these cottons in the past season and also gives the valuations of seven of the best :—

Register No.	Name of variety or Hybrid.	Area grown in 1908-09 in gunthas.	Ginning percentage.	Yield per acre of seed cotton.	Valuations.			
					The Bombay Chamber of Commerce.		Through the Imperial Cotton Specialist.	
					Value in rupees per candy of 784 lbs.	Remarks.	Value in rupees per candy of 784 lbs.	Remarks.
1	2	3	4	5	6	7	8	9
				Lbs.	Rs.		Rs.	
1367	Texas × Bourbon (13T).	10	...	1,114	Not	valued.	...	......
1368	Texas × Bourbon (15T).	10	...	705	Do.	......	...	......
1370	Texas × Bourbon (23T).	10	26·2	638	260	"Dull and stained, but nice staple."	290	"Navsári style of cotton."
1371	Texas × Bourbon (35T)	10	24·2	753	260	"Rather dull in colour; nice staple."	300	Do.
1377	Abassi × Bourbon (3T).	10	...	260	Not	valued.	...	......
1378	Abassi × Bourbon (18T).	5	...	192	Do.	......	...	......
1379	Abassi × Bourbon (20T).	5	24·1	145	260	"Dull colour seedy but nice staple."	325	"Egyptian style."
1380	Abassi × Bourbon (21T).	5	26·5	216	265	"Dull colour, but very nice staple."	350	Do.
1383	Abassi × Bourbon (3T).	5	30·5	56	270	"Dull and stained long and strong silky staple, rather seedy."	310	Do.
1386	Sea Island × Bourbon (18T).	5	29·8	...	340 (nominal.)	"Colour poor, very silky, long staple".	300	Do.
...	Spence Cotton ...	11	...	250	...	......	...	......
16T	Bourbon	10	...	568	...	......	...	"This sample has a mixed style. It has the appearance of Egyptian cotton, but the staple is very short resembling Broach."
23T	Bourbon	10	31·1	376	210	"Poor style, moderate staple, seedy and irregular."	235	......

The reasons why the valuations are much higher in the second case than in the first is because they were made on different occasions, and as commercial prices fluctuate from day to day the standard was taken higher in the second case.

14. All the hybrids with Texas as one parent open their bolls well, while 1380, which is an Abassi-Bourbon cross, opens its bolls much better than any other of the Abassi crosses. The ginning percentage can probably be raised considerably by selection. It will be noted that the American (Texas) hybrids all give a good outturn per acre. These cottons were irrigated 3 times which cost

Rs. 11-13-4, but advantage was taken of the possibility of growing a vegetable crop such as Bhendi between the rows. The cotton was planted 6 feet apart in each direction and hence there was ample room for the Bhendi in the early part of the season. The Bhendi crop yielded on an area of 3 acres 3,360 lbs. of green vegetable worth Rs. 81-10-4 and 24 lbs. of seed worth Rs. 12-0-0.

It will be seen that the value of the Bhendi per acre was Rs. 31-3-6 which greatly reduces the cost of production of the cotton crop. The cost of production works out at Rs. 69-3-0 per acre which, if we deduct the value of Bhendi, gives a nett expenditure of Rs. 37-15-6 per acre. It will be seen therefore that there is considerable cause to be satisfied with these results.

All of these hybrids appear to be biennials because they were well pruned back after the crop was harvested and now at the end of July they have grown vigorously and show every indication of giving an excellent yield in the coming season.

15. *Annual Cottons.*—The only cotton grown in the Charotar district is Rozi (G. Obtusifolium) which is a perennial variety and is usually left in the land for 5 years. It is sown in Bájri and Kodra fields, in rows about 7 feet apart, and at the end of each season it is pruned back close to the ground. The quality of the fibre is poor and it was thought desirable to compare the relative values of some of the commonly cultivated annual varieties. Accordingly four varieties were sown each on a 10-guntha plot and these all received similar treatment. None were irrigated.

16. The yields per acre however proved disappointing. This was due to two causes, first, frost in the month of December wrought great havoc, especially with Buri cotton. Buri cotton is a Bengal variety and it grew vigorously till damaged by frost. The crop also suffered from drought owing to the absence of late rains and the lightness of the soil.

No. of plot.	Variety of cotton.	Yield of seed cotton per acre.	Remarks.
		Lbs.	
125*b*	Buri	300	
126*b*	Wágad	244	These three cottons are all varieties of G. Herbaceum. Wágad possesses the peculiarity of not opening its bolls and the cotton is therefore gathered in the boll and afterwards separated.
127*b*	Lálio	268	
128*b*	Broach	302	

Wheat.

17. Wheat is an important crop in the Charotar, where it is grown as an irrigated crop by means of well water. Further north this crop is extensively grown on black soils as a dry crop in the Kaira and Ahmedabad districts where there are three or four varieties of wheat in cultivation, of which the chief are :—

Local name.	Colour.	Consistency.
Kátha	Red	Hard.
Wájia	Red	Soft.
Dhola	Yellow and white ...	Soft.
Popatia*	Red	Hard.

* This is spelt wheat.

The three first named wheats are all cultivated as dry crops, while Popatia is always selected for growing under well irrigation both because it yields heavily and more important still because it is for all practical purposes immune to rust. This wheat can also be stored with less risk of damage from weevils owing to the glumes remaining attached to the grain after threshing.

The usual price per maund of 40 lbs. at which these wheats are sold is Rs. 2-8-0.

18. No attempts have hitherto been made towards the improvement of wheat in this locality except occasionally casual distribution of seed from time to time. Work has therefore been commenced on two lines :

(1) Trials with exotic wheats ;

(2) Selection in the local varieties.

During the year under report 14 exotic varieties were tried on a small scale. The following statement gives general information about each of these wheats :—

Serial No.	Source.	Name.	Description.		Remarks.
			Colour.	Consistency.	
1	Punjab	Lál Kasarváli	White	Hard	Three of the best wheats grown at Lyalpur in 1907-08.
2	Do.	Dáudkháni of Delhi	Do.	Medium	
3	Do.	Australian No. 27	Do.	Soft	
4	United Provinces.	Muzfarnagar	Do.	Hard	Three of the best wheats produced in the United Provinces in 1907-08.
5	Do.	Red Khadir	Red	Do.	
6	Do.	Tamra	White	Do.	
7	Ma'njri, Bombay.	Shet Párner	Yellow	Do.	These were considered the five best wheats grown at Mánjri in 1907-08.
8	Do.	Hybrid of Nágpur × Muzfarnagar.	White	Do.	
9	Do.	Red Deshi of Oudh	Red	Do.	
10	Do.	Paman of Sirsa	White	Do.	
11	Do.	Australian Hybrid 28 $\dotplus \frac{32}{27}$.	Do.	Do.	
12	South Africa	Hoffmans	Do.	Soft	"Soft wheat, good for blending with Red Egyptian or golden bull, makes a nice wheat meal when ground alone."
13	Do.	Wolttaar	Do.	Do.	"Medium to soft, ripens in 4 months, heavy yielder and also good milling wheat."
14	Do.	White Llama	Do.	Do.	Same remarks as No. 12.

19. It will thus be seen that these wheats were all of Indian or Indo-Australian origin except three received from South Africa.

Several of these wheats have a very good appearance, especially some of the Punjab and Mánjri varieties. Australian No. 27 produces very long heads. Lál Kasarváli, Dáudkháni of Delhi and Tamra from the United Provinces have yielded best. Shet Párner is a hard yellow wheat of very good quality much liked by the trade.

These together with a few other selected varieties will be grown on a larger scale next year.

The selection work is referred to under "Seed Selection."

Ba'jri.

20. Three varieties of Bájri have been cultivated for some years past along with the local variety. These were grown

on a large scale (¼ of an acre each) during the year under report and the results are tabulated below :—

No. of plot.	Name of variety.	Yield per acre.		Remarks.
		Principal product.	By-product.	
		Lbs.	Lbs.	
125*a*	Bhávnagri Bájro ...	716	3,686	Bájro has very large grains.
126*a*	Nadiád Bájri ...	400	3,822	This is the local variety.
127*a*	Natal Bájri ...	587	4,853	
128*a*	West African Bájri ...	776	3,661	This is also called Bullrush millet and has very long heads but small grains.

The yields are below the average owing to the damage done by heavy rains. However Bájro and West African Bájri appeared to suffer less than the other two from such damage.

Sugar beet.

21. With the object of ascertaining whether this crop would flourish in the Charotar district some seed was obtained from Germany and France. Apart from the agricultural possibility of introducing such a crop there is the important consideration of manufacture. On the Continent of Europe this crop is largely and successfully grown, but there is a good organization there which enables the easy disposal of the beet by the grower. In other words small quantities of this crop cannot be profitably disposed of, but on the contrary a large factory can manufacture sugar from this crop at cheap cost provided there is a sufficiently large supply of the raw material to keep the factory fully employed. It is this latter aspect of the case which will chiefly influence the introduction of the crop provided it proves agriculturally suited to the conditions which prevail in the Charotar villages of Gujarát. This question of a market also applies to many other agricultural commodities but to a much greater extent where the crop is a totally new one. This however is more a question of trade than agriculture and it seems the duty of the Agricultural Department first to settle the question of whether the crop is agriculturally suited to the country and in the event of its proving a success the question of trade organization may have to be carefully considered at a later date. The following statement summarizes the results obtained during the year under report :—

Variety.	Yield per acre.	Percentage of sugar.	Remarks.
	Lbs.		
French rich ...	31,850	11·54	Growth vigorous, roots round.
Vilmorin white ...	24,850	13·46	Growth very vigorous, roots tapering.
German No. 402 ...	34,200	9·35	Growth fair, roots round.
German No. 403 ...	27,104	11·67	Do. tapering.

22. The average percentage of sugar in Germany and France is said to be about 15. The percentage in the farm grown beet is certainly lower but consideration should be made for the fact that the crop was grown from unacclimatized seed.

The yield per acre of the beet comes to about one-third of the best crop of sugarcane, but the two are not comparable for the reason that while sugarcane cannot be grown in the sandy soils of the Charotar country on account of white ants, sugar beet does not so far appear to be attacked by these insects.

Pulses.

23. Seeds of several Assam varieties of Vál (*Dolichos lablab*) were received from the Inspector-General of Agriculture in India and tried on a small scale. Several of these did well. The principal types were white flowered and purple flowered respectively. These Váls have all been carefully described and the best will be sown on a large scale next year. Similarly a number of soy-beans from Assam were also received from the Inspector-General of Agriculture. Some of these did well and will be grown again on a larger area next year.

Melons.

24. Cucurbitatious fruits are largely grown in the Charotar villages and it was thought desirable to try Hungarian melon, a variety, seed of which had been obtained from the Agricultural Department, United States of America. This is a very sweet melon. The seed was sown in the month of May and the plants bore fruit in the following August. Seed was again sown in the cold weather, but the crop was damaged by frost. The fruits obtained from the monsoon crop weighed about 10 lbs. each and proved to be very sweet to the taste. A little seed has been given to neighbouring cultivators for trial.

Tapioca.

25. This crop has the reputation of being a cheap famine food. With the object of seeing whether it was agriculturally

suited to the sandy loams of the Charotar villages a trial was made with cuttings obtained from Poona. These were put out in the month of August 1908. The plants grew well on this soil.

26. The crop was planted on an area of 6 gunthas. No manure was applied, but the crop was once irrigated. This however was perhaps unnecessary and no irrigation will be applied next year when the trial will be repeated. About 21 inches of rain fell after the crop had been planted. The plants remained healthy and grew vigorously, the best plant attaining a height of 6½ feet.

27. In the field the crop appeared to be a fair one, but the outturn of green tubers was at the rate of only 4,000 lbs. per acre when the crop was dug out in May 1909. These were dried and sliced and the dry weight came to 1,306 lbs. or about one-third of the green weight. The average yield per plant was 3½ lbs. green, while the best plant gave an outturn of 9¼ lbs. of green tubers. There appeared to be two varieties, *viz.*, red and white, but no plant produced flowers.

SECTION B.—MANURIAL EXPERIMENTS.

Experiment No. I (on Tobacco).

28. This experiment has been in progress for the last four years. The general scheme of the experiment will be seen from the annexed diagram. It will be observed that various manures such as castor cake, sodium nitrate and sulphate of ammonia are under trial along with farmyard manure.

29. The tobacco seedlings were planted out in August in wet weather which however caused much damage; subsequently there was a bad outbreak of stem borer. This is a small caterpillar which ultimately developes into the moth (*Gnorimoschania heliopa*). It eats away the pith at the base of the stem; this causes the stem to swell and further growth is checked. The plants afterwards die owing to interference with proper nourishment. Nearly three-fourths of the area over which the experiment extends was damaged by this borer. In the district also the damage was very severe, so much so, that several cultivators ploughed up their crops and sowed wheat, jiru, etc., in its stead. The attacked plants in this experiment were all removed and burnt and blanks were filled up with the aid of irrigation.

30. The natural result of all this damage done first by excessive rains and then by the borer was that the crop became most uneven and quite useless for comparative purposes between the various plots.

	No manure. 141A.		F. Y. M. + Ammonium Sulphate. (20,000 lbs. + 112 lbs.) 141B.
Deep Cultivation.	F. Y. M. + Sodium Nitrate. (20,000 lbs. + 112 lbs.) 16	Shallow Cultivation.	F. Y. M. + Sodium Nitrate. (20,000 lbs. + 112 lbs.) 5
	F. Y. M. + Nitre. (20,000 lbs. + 112 lbs.) 15		F. Y. M. + Nitre. (20,000 lbs. + 112 lbs.) 4
	F. Y. M. + Castor cake. (20,000 lbs. + 600 lbs.) 14		F. Y. M. + Castor cake. (20,000 lbs. + 600 lbs.) 3
	Castor cake. (2,000 lbs.) 13		Castor cake. (2,000 lbs.) 2
	F. Y. M. (30,000 lbs.) 12		F. Y. M. (30,000 lbs.) 1

Note.—The manures are applied every year to the tobacco crop which is grown continuously. The area of each plot is 10 gunthas and the quantities shown above represent the rates per acre.

The results are therefore not tabulated; but the crop taken as a whole was a good one in a season when so much damage was sustained. The average yield per acre over the whole area was 1,771 lbs., whereas the crop in the surrounding district was a 6 anna one, and yielded at the rate of about 800 lbs. per acre.

Experiment No. II (on Tobacco).

31. This is supplementary to experiment No. I, and its results should be compared with those of plots 1 and 12 of that experiment,

The experiment is with green manure for tobacco when the latter is grown continuously every year or rotated with kodra mixture in alternate years.

The general scheme of the experiment will be gathered from the diagram below:—

<table>
<tr><td rowspan="10">↑
Deep cultivation.
↓</td><td colspan="2">Farmyard Manure.
30,000 lbs. per acre every second year before tobacco.</td><td rowspan="10">↑
Shallow cultivation.
↓</td></tr>
<tr><td>Tobacco.
(38)</td><td>Tobacco.
(27)</td></tr>
<tr><td colspan="2">Farmyard Manure.
30,000 lbs. per acre applied in June, every second year before tobacco.</td></tr>
<tr><td>Kodra Mixture.
(37)</td><td>Kodra Mixture.
(26)</td></tr>
<tr><td colspan="2">San ploughed in green in August every second year before tobacco.</td></tr>
<tr><td>Tobacco.
(36)</td><td>Tobacco.
(25)</td></tr>
<tr><td colspan="2">San ploughed in green in August every second year before tobacco.</td></tr>
<tr><td>Kodra Mixture.
(35)</td><td>Kodra Mixture.
(24)</td></tr>
<tr><td colspan="2">San ploughed in green in August before the tobacco crop which is grown continuously.</td></tr>
<tr><td>(34)</td><td>(23)</td></tr>
</table>

The same remarks apply to this experiment as have been made with regard to experiment No. I concerning the unevenness of the crop, rendering this year's results valueless for comparative purposes. The average yield of tobacco on the plots of this experiment was 1,634 lbs. per acre.

Experiment No. III.

32. This experiment is really a part of Experiment No. II reported above, but the crops dealt with here are those taken in rotation with tobacco which was the crop dealt with in reporting Experiment No. II above. The rotation crop was kodra mixture and it was rotated with tobacco which had been manured with farmyard manure in one case and green manure in the other, both on deep ploughed and ordinary ploughed plots. The rate of application of farmyard manure to the previous tobacco crop was 30,000 lbs. per acre.

The following statement summarizes the results obtained in the year under report :—

Ordinary ploughing.						Deep ploughing.					
No. of plot.	Crop.	Yield per acre.		Value of produce.	Cost of production.	No. of plot.	Crop.	Yield per acre.		Value of produce per acre.	Cost of production per acre.
		Principal product.	Bye-pro duct.					Principal product.	Bye-product.		
		Lbs.	Lbs.	Rs. a. p.	Rs. a. p.			Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
				Green Manure.							
24	Kodra ...	724	2,036	39 4 4	19 1 4	35	Kodra ...	776	2,044	42 12 0	20 1 4
	Tal ...	52	...				Tal ...	92	...		
	Tuer ...	68	140				Tuer ...	80	156		
	Sheria ...	56	Fibre 52				Sheria ...	56	Fibre. 36		
				Farmyard Manure.							
26	Kodra ...	796	2,000	47 10 8	16 9 0	37	Kodra ...	604	1,524	44 12 8	17 13 0
	Tal ...	92	...				Tal ...	200	...		
	Tuer ...	116	208				Tuer ...	26	88		
	Sheria ...	108	Fibre. 52				Sheria ...	64	Fibre. 38		

33. It will be observed that the yields on the plots manured with farmyard manure are superior to those manured with green manure and this is much more marked on the ordinary ploughed plots than on the deep ploughed plots, while the cost of production on the green manure plots is more by Rs. 2-8-0 than that on the farmyard manured plots. The nett result therefore is very much in favour of farmyard manure. The effect of deep ploughing appears to be very small, but in a season, such as the one under report, we must not put too great a reliance in the results obtained.

Experiment No. IV.

34. The objects of this experiment were to test the value of green manure against farmyard manure for the potato crop and secondly to compare the profits of taking three crops in one year with that of distributing the same three crops over a period of two years.

The experiment is conducted in duplicate to ascertain the influence of deep ploughing upon these problems. Each plot is of 10 gunthas in area. The potato crop alone is manured. The manures applied to the potato crop per acre are 20,000 lbs. of farmyard manure or san green manure plus 112 lbs. potassium sulphate plus 800 lbs. of castor cake. In the case of plots 61 and 71, which carry the three crops each year, half the above qualities of manure are applied each year.

35. The following statement summarizes this year's results. It should be noted that plots 63 and 62 form a 2-year rotation. Similarly plots 65-64, 73-72 and 75-74 form a 2-year rotation :—

Ordinary Cultivation.							Deep Cultivation.						
Group of plots.	No. of plot.	Crop.	Yield per acre.		Value of produce per acre.	Cost of production per acre.	Group of plots.	No. of plot.	Crop.	Yield per acre		Value of produce per acre.	Cost of cultivation per acre.
			Principal product.	Bye product.						Principal product.	Bye product.		
						Farmyard Manure.							
			Lbs.	Lbs.	Rs. a. p.	Rs a. p.				Lbs.	Lbs.	Rs. a. p	Rs. a. p.
I	61	Bájri ...	...	1,792	8 15 4	10 11 8	1	71	Bájri ...	...	1,520	7 9 8	11 11 8
		Potatoes	1,708	...	28 0 4	148 9 8			Potatoes	3,320	...	51 7 4	156 7 8
		Sundhia	...	4,352	54 6 5	29 7 8			Sundhia.	...	5,016	62 11 2	26 15 8
					91 6 1	178 73 0						124 12 2	195 3 0
						San Green Manure.							
II	63	Bájri ...	...	2,016	10 1 4	11 6 8	II	73	Bájri ...	...	2,092	10 7 4	12 6 8
	62	Potatoes	2,520	...	41 5 4	167 7 4		72	Potatoes	5,408	..	83 11 8	176 11 8
		Sundhia.	...	3,992	49 14 5	31 2 8			Sundhia	...	4,992	62 6 5	26 7 8
					101 5 1	210 0 8						161 9 5	215 8 0
						Farmyard Manure.							
III	65	Bájri ...	...	1,520	7 9 4	11 6 8	III	75	Bájri ...	...	1,872	9 6 0	12 6 8
	64	Potatoes	4,896	...	80 5 4	183 7 0		74	Potatoes	4,260	...	71 8 4	187 8 0
		Sundhia.	...	4,708	58 13 7	38 8 8			Sundhia	...	5,248	65 9 7	29 10 8
					146 12 3	225 6 4						146 7 11	229 9 4

Note I.—In plots 62, 64, 72 and 74, Potatoes were grown in cold weather and Sandhia in the hot weather and both were irrigated.

Note II.—The tillage for the Sundhia crop was in all cases ordinary, but it is presumed that the previous deep ploughing for potatoes influenced the yield of the crop.

36. The results with regard to bájri and potatoes are valueless because in the case of bájri the seed had to be sown three times on account of damage done by excessive rains followed by drought, while the potato crop was very badly damaged by frost in December.

The conclusions which can be drawn from this experiment are therefore very limited. However, we may observe that the deep ploughed plots have on the whole given the best outturns.

In order to compare group I with group III we must halve the figures in group III and the inference seems to be in favour of taking all three crops in one year.

The results are inconclusive with regard to the comparison of green manure with farm yard manure.

Experiment No. V.

37. This experiment was made with the object of ascertaining whether nitre could be profitably applied to the rice crop as a supplementary manure to farm yard manure and also to study the residual values of the manures on wheat taken in the succeeding cold weather. The experiment was conducted both with irrigated and unirrigated rice. The absence of late rains caused the unirrigated crop to be a failure, while even the irrigated crop was a partial one. The application of nitre seems to have greatly increased both irrigated and unirrigated rice crops. The succeeding wheat crop did better on the plots where the irrigated rice had been but the yields even on these plots are very moderate. Rust also did some damage. It would further appear that nitre by increasing the yield of rice had decreased the residual value of the farm yard manure. The price of nitre is one rupee for 9 lbs. in the locality of the farm.

No. of Plot.	Manurial treatment per acre.	Crop in rains.	Yield per acre.		Value of produce per acre.	Cost of production per acre.	Crop in Cold Weather.	Yield per acre.		Value of produce per acre.	Cost of production per acre.
			Principal Product.	Bye Product.				Principal Product	Bye Product.		
					Irrigated.						
	Lbs.		Lbs.	Lbs.	Rs. a. p.	Rs. a. p.		Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
94	20,000, F.Y.M. + 83 Nitre.	Rice (Sutarsál).	1,600	2,453	62 4 1	69 1 6	Dhola wheat.	1,000	1,913	59 6 0	56 14 0
95	20,000, F.Y.M.	Rice (Sutarsál).	758	1,267	30 9 4	53 15 6	Dhola wheat.	1,010	1,684	59 15 2	50 5 0
					Not Irrigated.						
90	20,000, F.Y.M. + 80 Nitre.	Rice (Sutarsál).	600	1,579	25 1 8	53 13 9	Dhola wheat.	740	2,167	43 15 0	76 9 0
91	20,000, F.Y.M.	Rice (Sutarsál).	467	1,320	21 2 11	15 6 2	Dhola wheat	900	2,060	53 7 4	76 9 0

Note.—Beside one watering at the time of preparing the seed bed the rice was watered twice and wheat was watered three times. The value of the wheat straw which is worth Re. 1 per 500 lbs. is not included in the above figures.

SECTION C.—CULTURAL EXPERIMENTS.

Experiment No. I.

38. This was an experiment conducted with the object of comparing the advantages of deep and shallow cultivation for the commonly cultivated kharif dry crops. By deep cultivation is meant ploughing land once with the large turn wrest plough; by shallow cultivation is meant ploughing with the country wooden plough only.

The results of the year under report are summarized in the following tabular statement:—

Shallow Cultivation.						Deep Cultivation.					
No. of Plot.	Crop.		Yield per acre.		Value of produce.	No. of Plot.	Crop.		Yield per acre.		Value of produce.
			Grain.	Fodder.					Grain.	Fodder.	
			Lbs.	Lbs.	Rs a. p.				Lbs.	Lbs.	Rs. a. p.
9	Bájri Mixture.	Bajri ...	104	824	19 4 0	20	Bájri Mixture.	Bájri ...	168	984	28 5 5
		Math ...	96	804				Math ...	144	1,192	
		Túr ...	18	72				Túr ..	18	64	
10	Kodra Mixture.	Kodra ...	432	872	54 11 4	21	Kodra Mixture.	Kodra ...	452	1,068	63 9 0
		Tal ...	212	...				Tal ...	268	...	
		Túr ...	376	620 (fibre).				Túr ...	444	560 (fibre).	
		Sheria ...	42	24				Sheria ...	40	34	
11		Sundhia...	98	2,168	27 10 8	22		Sundhia...	76	2,428	34 0 4

Note,—The cost of production of	Bájri mixture	shallow	ploughed was	Rs.	34	1	4
Do. do.	do.	deep	do.	,,	35	1	4
Do. do.	Kodra mixture	shallow	do.	,,	17	1	0
Do. do.	do.	deep	do.	,,	19	13	4
Do. do.	Sundhia	shallow	do.	,,	13	9	0
Do. do.	do.	deep	do.	,,	14	9	0

39. Each plot is 10 gunthas in area (*i. e.*, $\frac{1}{4}$th of an acre) and the bájri mixture is manured at the rate of 15,000 lbs. of farm yard manure per acre. The three crops named are rotated so that the rotation is a three-year one.

The results indicate a very substantial advantage to be gained from deep cultivation amounting to Rs. 6 to 10 per acre, less Rs. 1 to Rs. 2-12-0, which is the extra cost of deep ploughing.

40. The question of the desirability of deep ploughing for kharif crops is not determined entirely by the yield. Due consideration should be given to the question of expeditious sowing. It has generally been the experience for several years past that the sowing period is a very limited one and liable to be curtailed and interrupted at any time. We have seen that in the season under

report there was a chance of sowing in June, but no other opportunity occurred between the 1st July and the 27th August, when the proper sowing season had passed away. Hence any operation which delays sowing even for a day may be the indirect cause of losing the whole crop owing to a change in the weather preventing further progress with the work, either for a long spell or perhaps altogether.

41. Referring to details we see from the above statement that the yield of bájri and túr was much below the average. The yield of kodra mixture was up to the average, while the outturn of sundhia fell much below the average, as owing to continuous heavy rains the plants became pale and stunted.

Experiment No. II.

42. This experiment was similar to No. I, and in this case deep ploughing for kodra mixture and bájri mixture, when associated with rozi cotton, was under investigation. These two mixtures form a two-year rotation, the rozi cotton, which is a perennial, remaining in the land for about 5 years. The bájri mixture is manured at the rate of 15,000 lbs. of farm yard manure per acre which accounts for the cost of production being higher than that of the kodra mixture. In the tabular statement below which summarizes this year's results, all the cost of manure is debited to bájri mixture but, of course, the kodra mixture will benefit next year.

Shallow ploughed.						Deep ploughed.					
No. of Plot.	Crop.	Yield per acre.		Value of Produce per acre.	Cost of Production per acre.	No. of Plot.	Crop.	Yield per acre.		Value of Produce per acre.	Cost of Production per acre.
		Principal Product.	Bye Product.					Principal Product.	Bye Product.		
				Bájri Mixture with Rozi Cotton.							
		Lbs.	Lbs.	Rs. a. p.	Rs. a. p			Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
69	Bájri ..	304	3,112	40 7 8	37 12 4	79	Bájri ...	220	2,092	29 15 4	39 14 4
	Múg ...	120	592				Múg ...	84	596		
	Math ..	...	...				Math ...	...	...		
	Túr ...	10	40				Túr ...	2	16		
	Rozi Cotton,	88	...				Rozi Cotton.	48	...		
				Kodra Mixture with Rozi Cotton.							
70	Kodra ...	464	2,284	36 12 8	23 7 0	80	Kodra ...	553	2,740	41 12 8	24 3 8
	Tal ...	40	...				Tal ...	36	...		
	Túr ...	172	356				Túr ...	164	252		
	Sheria ..	50	32 (fibre)				Sheria ...	100	36 (fibre)		
	Rozi Cotton.	36	...				Rozi Cotton.	52	...		

43. Before making any comments on the above statement it should be pointed out that the rozi cotton became diseased and much of it died out. Further, owing to the very unfavourable season the yield of all the crops is below the average, and this was particularly the case with bájri. It therefore seems desirable not to draw any very dogmatic conclusions from this year's figures.

Experiment No. III.

44. This was also a comparison of deep and shallow tillage in the following two-year rotation :—

1st year ... { Monsoon crop—Bájri.
Rabi crop—Wheat (irrigated).

2nd year ... Kodra mixture.

This year's results are summarized below for what they are worth, but both wheat and bájri are below the average; the latter suffered in the first place from excesssively heavy rains, and afterwards from lack of late rains. The wheat crop was much damaged by white ants.

In the case of kodra the germination was bad and the seed had to be sown three times owing to repeated damage done by heavy rains, while very few seeds of the subordinate crops of til, túr and sheria germinated.

Shallow ploughing.						Deep ploughing.					
No. of Plot.	Crop.	Yield of produce per acre.		Value of produce per acre.	Cost of production per acre.	No. of Plot.	Crop.	Yield of produce per acre.		Value of produce per acre.	Cost of production per acre.
		Principal Product.	Bye Product.					Principal Product.	Bye Product.		
					Bájri followed by Wheat.						
		Lbs.	Lbs.	Rs. a. p.	Rs. a p.			Lbs.	Lbs.	Rs. a. p.	Rs. a. p
51	A—Bájri ...	334	3,016	31 14 0	40 15 0*	59	A—Bájri ...	364	3,816	35 0 0	*41 15 0
	B—Wheat ...	940	1,660	35 4 0	77 0 0		B—Wheat ...	1,112	1,892	41 11 4	77 10 0
				63 10 4	117 15 0					70 5 8	119 9 0
					Kodra Mixture.						
	Kodra ...	420	1,276	24 12 4	20 11 8	60	Kodra ...	640	1,996	27 7 0	21 11 8
	Tal ...	...	...				Tal ...	...	...		
	Túr ...	84	200				Túr ...	28	72 (fibre)		
	Sheria ...	...	...				Sheria ...	60	26		

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* 20,000 lbs. of farm yard manure were applied, costing Rs. 22-6-0, which of course will benefit succeeding crops.

Experiment No. IV.

45. The usual distance between the rows of bájri, bájro, kodra, and sundhia is one foot. With the object of ascertaining whether this is the most economical distance an experiment was carried out during the year under report.

There was the further object of comparing the yield of bájri with that of bájro. Broach cotton was also tested at different widths between the rows. The cotton crop was manured at the rate of 7½ tons of farm yard manure per acre. Cultivation in other respects was similar to local practice.

The results are summarized below:—

Plot No.	Crop.	Distance between consecutive rows.	Yield per acre.		Value of the produce.			Remarks.
			Grain.	Fodder.				
			Lbs.	Lbs.	Rs.	a.	p.	
104	Bájri	1′	360	2,728	29	6	4	
122A	Do.	1½′	635	3,962	47	9	6	
105	Bájro ... ,,	1′	344	2,704	28	9	0	
122B	Do.	1½′	536½	3,067	33	9	4	
109	Kodra	1′	68	2 8	61	5	0	
	Tal		428	...				
	Túr		300	524				
	Sheria		54	41 (fibre)				
111	Kodra	1½′	132	912	62	5	4	
	Tal		284	...				
	Túr		600	768				
	Sheria		36	28 (fibre)				
113	Sundhia	1′	96	1,812	38	15	4	
115	Do.	1½′	156	1,904	44	7	4	
102	Broach Cotton ...	1½′	214	...	20	1	0	Damaged by white ants.
103	Do.	1½′	435	...	40	12	4	
106	Do.	2′	393	...	36	13	4	
107	Do.	2′	166	...	15	9	0	Damaged by white ants.

Bájri, bájro, kodra and sundhia have yielded more when sown 1½′ apart. The Broach cotton crop was much damaged by white ants and the results are not conclusive.

Experiment No. V.

46. An experiment was made in testing the best number of rice seedlings to transplant at one place. The plot No. 93 was divided into 3 sub-divisions and one, two and three seedlings were transplanted at each place in the three sub-divisions, respectively. The plot was manured with 20,000 lbs. of farm yard manure per acre.

The results obtained were as under :—

Plot No.	Crop.	No. of Seedlings.	Yield per acre.		Value of Produce.		
			Grain.	Fodder.			
			Lbs.	Lbs.	Rs.	a.	p.
93A	Sutarsál rice	1	745	1,490	30	11	8
93B	Do.	2	1,365	2,708	56	3	9
93C	Do.	3	1,557	2,709	62	3	11

It will be observed that three seedlings have given the best yield, in the year under report, but the season was not a good one for rice.

SECTION D.—ROTATIONAL EXPERIMENTS.

Experiment No. I.

47. It is the universal practice in the Charotar to grow mixed crops in preference to individual ones with such crops as Bájri, Kodra, Bávto, pulses and castors.

This is probably done with the object of insuring the outturn against the many risks to which any individual crop is subject, especially climatic. Accordingly it was thought desirable to conduct an experiment to ascertain whether in a series of years the mixed system or the individual or single system gives the greater profits. The following statement summarizes the first year's results :—

Single Crops.							Mixed Crops.					
Groups.	No. of Plot.	Crop.	Yield per acre.		Value of Produce per acre.	Cost of Production per acre.	No. of Plot.	Crop.	Yield per acre.		Value of Produce per acre.	Cost of production per acre.
			Principal Product.	Bye Product.					Principal Product.	Bye Product.		
			Lbs.	Lbs.	Rs. a. p.	Rs. a. p			Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
I	42	Kodra .	828	1,544	26 6 8	15 1 8	31	Kodra .. Tal ... Túr ... Sheria ...	500 132 116 32	1,188 ... 208 48 (fibre).	38 12 4	19 13 0
II	44	Bájri ...	480	3,456	38 4 6	14 12 0	33	Bájri ... Mug ... Math ... Tur ...	468 172 24 68	3,402 620 192 116	49 15 0	19 5 0
III	43	Bávto ... Castors ... Vál ...	322* 163 54	480 ... 28	22 2 0	18 1 0	32	Bávto ... Castors ... Vál ...	600 ... 9	1,732	25 9 4	22 5 8

† The yield of each crop on plot 43 is calculated for ⅓ of an acre as it was equally divided between Bávto, castors and vál.

48. It will be observed that the mixed crops have given the greatest net profit in groups I and II while there is very little difference between the mixed and single crops in group III. It is important to point out here that there is a difference in the design of the experiment with regard to groups I and II on the one hand and group III on the other. In the former two groups, only the principal crop is sown on the plots reserved for single crops, while in group III not only the principal crop but the minor crop of castors and vál are also sown each on $\frac{1}{3}$ of the area.

49. The season was an excellent one for studying the reasons which are alleged for the local favour of sowing mixed crops, because a good deal of damage was sustained. Apart from the excessive rains which indirectly caused the castors and vál to become entire failures in plot No. 32 owing to the Bávto being forced into a vigorous crop which smothered the other two subsidiary crops, there was frost which wrought great havoc with the vál crop on plot 43.

The experiment will be continued and the problems involved further studied.

Experiment No. II.

50. With the object of ascertaining whether there is any advantage to be gained by rotating bájri mixture with kodra mixture over cultivating each of these mixtures continuously this experiment was made and the results obtained during the year under report are tabulated below.

As this is the first year of the experiment no conclusions can be drawn. It may be remarked however that a good margin of profit amounting to Rs. 30 to Rs. 40 per acre was obtained on all the plots.

Group of Plots.	Rotation.	No. of Plots.	Crop.	Yield per acre.		Value of Produce per acre.	Cost of production per acre.
				Principal product.	Bye Product.		
				Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
I	Continuous Bájri mixture.	137	Bájri	424	3,720	53 4 0	22 4 9
			Múg	144	816		
			Math	12	184		
			Túr	120	216		
II	Bájri mixture and Kodra mixture in rotation.	138	Bájri	472	3,424	51 12 0	21 10 9
			Múg	96	600		
			Math	32	248		
			Túr	80	192		
		139	Kodra	568	1,392	60 10 0	18 9 3
			Tal	264	...		
			Túr	248	400		
			Sheria	40	60 (fibre		
III	Continuous Kodra mixture.	140	Kodra	312	792	51 12 0	18 11 3
			Tal	280	...		
			Túr	192	264		
			Sheria	72	60 (fibre)		

SECTION E.—SEED SELECTION.

51. This has been carried out with the following crops:—wheat, bájri, túr, chola, guvár, tal, and castors.

52. *Wheat.*—The selection in wheat was conducted with the object of increasing the yield by improving the size of the head and tillering character and also by combating the injury done by rust.

53. *Bájri.*—It has frequently been observed that this plant crosses very freely in the field. Now 3 or 4 new varieties have been grown on the farm for some years, and one of these, *viz.*, bulrush millet or West African bájri, has a somewhat different appearance to local Deshi bájri owing to the very great length of its head and the small size of the grain. In the field it had been observed that some of the heads have lost their natural appearance and become like Deshi bájri. This has probably been brought about by natural crossing. Selection has therefore been made of the best types of these apparent crosses.

54. *Túr.*—Local Deshi túr consists of several types. There are the red and white seeded varieties which otherwise seem to be alike but the pods of the Deshi white type are sometimes black, sometimes white and sometimes mottled (black and white). All

these types have been separately selected with the object of seeing whether the distinguishing characters are "fixed." Selection for large sized pods has also been made in these local types as well as in three or four new varieties which have been found to promise well. These are from Bangalore, Bilàspur, Sambalpur and Indo-China.

55. *Chola* (*Vigna catiang*).—The following varieties were grown for the selection of seed :—

White large.	White small.
Red large.	Red small.
Black.	Large Devgad Baria.

56. *Guvár* (*Cyamopsis psoralioides*).—The following varieties were grown for selection of seed :—

Sotia.	Vánkadia.
Telia.	Pardeshi.

57. *Tal* (*Sesamum indicum*).—The following varieties were grown for selection of seed. Samples were kindly analysed by the Agricultural Chemist with the following results :—

Name of Variety.	Percentage of oil.	Percentage of Moisture.
White Ahmednagar	49·24	3·49
White Kánara	47·30	3·66
White Dhárwár	49·23	3·47
White Local	53·01	4·10
Black Dhárwár	49·47	4·08
Black Local	50·30	4·21
Black Kánara	49·77	3·91
White Baroda	47·96	4·18

From the above analyses the local varieties appear to be superior to all others.

58. *Castors* (*Ricinus communis*).—The following varieties were grown for selection of seed : Paras, Chani, and purple stemmed.

SECTION F.—CROP PESTS.

59. The most serious insect pest of the year was the tobacco stem borer (Vern. Dedkin, Gnorimoschema Helioper, G. heliopa). The tobacco crop throughout the whole district was seriously damaged by the borer and everywhere the crop became very uneven owing to the havoc wrought by this insect. The damage is done in the caterpillar stage by the larvæ of a small moth which bores into the stems of the tobacco seedlings while still in the nursery. The vernacular name Dedkin is due

to the swelling in the shoot, the top of which is usually attacked; that is why it is said to resemble the neck of a croaking frog.

60. After entering the shoot, the caterpillar feeds on the pith and the irritation set up causes the swelling referred to. This susbequently causes the death of the plant. Mr. Kásárgode, Assistant Entomologist, in the course of his investigations, observed that numbers of tobacco plants are to be found practically all the year round, and this seemed to suggest that the insect was probably enabled to survive from one season to the next by the food supplied by these plants. It was observed that a very large number of the plants in the seed beds were affected by this insect and the tobacco fields planted with these seedlings also showed a great number of blanks due to the number of plants constantly dying off. It was observed that seedlings, which had been transplanted before the second generation of this moth had had time to lay their eggs, were very slightly attacked.

61. When the plants become older these caterpillars seem to transfer their attack to the bark, which is probably due to the latter being softer and easier to cut through than the woody portion. It would, therefore, appear that the attacks of this insect emanate from the tobacco seed beds and preventive measures should, therefore, be applied there. The following measures are recommended:—

(1) The seed beds are small and it should therefore be within the power of any cultivator to remove the first seedlings which become affected. These should be destroyed before the caterpillars emerge and thus further generations of this insect would be impossible. The affected plants are easily seen from the swollen appearance of the shoot.

(2) Early transplanting is also to be recommended; for, in this way, the seedlings when they are transplanted have had no eggs deposited on them by the second generation of the moth.

(3) Tobacco fields should be ploughed up after harvest so that the plants may not sprout again after harvest and serve the purpose of propagating this pest and similarly no plant should be allowed to remain in the seed beds after the transplanting season is over.

62. The sugarcane borer (Chilo simplex) did a great deal of damage to sugarcane planted in May. The attacked shoots were cut and burnt; but probably the safest preventive measure to adopt is to plant the cane early.

63. White ants continued to do a great deal of damage to such crops as cotton and wheat, while sugarcane cannot be grown on account of the damage they cause. No satisfactory remedy has yet been devised against this insect but a machine from South Africa has been obtained. It is said to do very good work in South Africa. It acts on the principle of forcing obnoxious fumes into the underground habitations of these insects, but while it is likely to be very effective in the case of the white ants' nests which are visible it is not likely to prove useful in the field where the damage to crops is chiefly done at a distance from the nests.

64. Leaf rollers (Sylepta derogata) in the caterpillar stage damaged a few plots of cotton and showed a special preference for the Buri variety. The affected leaves were collected and burnt.

65. Kátra or hairy caterpillars (Amsata lincola) attacked young plants of Bájri, Kodra, san and tal but the damage done was only slight.

SECTION G.—MISCELLANEOUS.

66. *Fibre Crops* :—Apart from cotton the two commonly cultivated fibre crops in the Charator are san and sheria. With the object of ascertaining which of these crops leaves the greater margin of profit an experiment was conducted in which both were grown on an area of ¼ of an acre.

No manure was applied and cultivation was conducted according to local practice. The san crop was a good one but the sheria did not grow so tall as it usually does when grown as a mixed crop. The other constituents of the mixture seem to draw it up.

67. The results are summarized below :—

Plot No.	Crop.	Yield per acre.		Value of produce.	Cost of cultivation.	Cost of extracting fibre.
		Grain.	Fibre.			
		Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
117	San ...	1 200	474	71 3 0	42 3 8	23 8 0
119	Sheria	480	300	36 12 0	20 14 4	4 1 0

The cost of extracting fibre from san is heavy. If we take into consideration the cost of extracting the fibre sheria leaves the larger margin of profit; but apart from this san is a very profitable crop.

68. *Ensilage.*—This is now annually made. In the year under report 49,064 lbs. of green grass were filled into the Silo between the dates of 14th and 18th September. The Silo was opened in the month of March. 27,000 lbs. were obtained. This was fed to the work cattle at the rate of 40 lbs. each per day. In addition to this ensilage each animal was given 2½ lbs. of guvár. The ensilage lasted 8 bullocks for 12 weeks during the hot weather at the time when kadbi was selling at 50 lbs. per rupee.

The cost of the ensilage worked out at Rs. 137-11-0. It will be thus seen that a handsome saving was effected.

A sample of the ensilage was sent to the Agricultural Chemist who kindly analysed it. The analysis is given below :—

Ingredients.	Percentage.
Moisture	67·84
Oil	3·80
Albuminoids	0·73
Soluble Corbohydrates ...	15·86
Woody fibre	6·64
Ash	5·13
	100·0
Sand	3·9
Nitrogen	0·12
Acetic Acid	0·27
Lactic Acid	0·546

69. *Control plots.*—Government in their Resolution No. 8241, dated 20th August 1907, R. D., have directed that a few plots should be put aside for the purpose of studying the influence of season on the outturn of the staple crops cultivated in the district and also to serve as a guide of the outturns, which a careful cultivator may be expected to get from ordinary local methods of cultivation, compared with land specially well treated as regards manure and tillage.

Accordingly 2 plots treated in the country method and sown with kodra mixture and bájri respectively were compared with two plots sown with the same crops and manured at the rate of 15,000 lbs. of farm yard manure per acre.

The results obtained in the season under report were as stated below :—

Treated according to Cultivator's methods.

No. of Plot.	Crop.	Yield per acre.		Value of produce per acre.	Cost of production per acre.
		Principal product.	Bye-product.		
		Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
124A	Kodra	275	898	100 5 7	23 4 8
	Tal	619	......		
	Tur	628	796		
	Sheria	65	24 (Fibre).		
123A	Bájri	812	4,664	58 13 9	15 1 5

Specially well treated.

No. of Plot.	Crop.	Yield per acre.		Value of produce per acre.	Cost of production per acre.
		Principal product.	Bye-product.		
		Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
124B	Kodra	362	1,252	100 15 0	39 13 11
	Tal	416	......		
	Tur	1,000	1,068		
	Sheria	74	38 (Fibre.)		
123B	Bájri	648	5,588	56 4 8	32 6 0

70. The statement above shows very excellent profits, but as a guide to the seasonal effect upon cultivators' crops it must be regarded as altogether unreliable. The good yields in kodra mixture are due to the fact that the seed was sown on the 19th of June and 4th of July respectively, just when there was one day suitable for sowing, whereas most of the land in the neighbourhood could not be sown till the end of August owing to continuous down pours of rain from the 1st of July to that date.

71. The highly manured plots have yielded badly in comparison with the non-manured plots. This was due to the absence of late

rains which is always felt more in land which has been manured. This is particularly noticeable in the case of bájri, where the fodder obtained from the manured plots exceeded that obtained from the unmanured plot, although the yield of grain was less; thus proving that the ear heads did not fill well on the manured plots for want of sufficient moisture.

The yields on all the plots taken as a whole must be regarded as very good considering the season.

SECTION H.—EXPERIMENTS MADE OFF THE STATION.

72. To demonstrate the use of fertilisers a few experiments on rice and tobacco were arranged in cultivators' fields.

The following table gives the details of rice experiments :—

Serial No.	Area.	Crop.	Manure.			Value of manure per acre.	Irrigated or not.	Yield per acre.		Value of produce.	Profit or loss per acre due to manure.
			Kind.	Quantity.				Grain.	Fodder.		
				Per plot.	Per acre.						
	A. g.			Lbs.	Lbs.	Rs. a. p.		Lbs.	Lbs.	Rs. a. p	Rs. a. .
1	0 29	Rice.	1 Ammonium Sulphate.	36½	50	9 2 8	Nil ...	772	862	28 7 0	−1 7 5
			2 Potassium Chloride.	36½	50						
	0 29	Do. .	Nil ...	Nil.	Nil.	...	Nil ...	552	690	20 11 9	
2	1 8	Do. .	1 Ammonium Sulphate.	60	50	9 2 8	Nil ...	767	833	28 0 10	−6 9 0
			2 Potassium Chloride.	60	50						
	1 8	Do. .	Nil ...	Nil.	Nil.	...	Nil ...	700	729	25 7 2	
3	0 37	Do. .	1 Nitre ...	74	80	8 14 3	Irrigated once.	1,362	1,605	50 9 2	+13 15 0
	0 6	Do. .	Nil ...	Nil.	Nil.	...	Do. ...	667	1,380	27 11 11	
4	1 7	Do. .	1 Ammonium Sulphate.	53	45	8 5 8	Do. ...	2,225	2,296	81 0 2	+21 6 8
			2 Potassium Chloride.	35½	30						
			3 Basic Slag ...	58¾	50						
	0 6	Do. .	Nil ...	Nil.	Nil.	...	Do. ...	1,400	1,447	51 3 10	

Experiments Nos. 1 and 2 have resulted in loss owing to failure of late rains. Nitre has given a net profit of Rs. 13-15-0 in experiment No. 3; while Ammonium Sulphate+Potassium Chloride+Basic Slag have given a profit of Rs. 21-6-8.

73. The following are the results of tobacco experiments :—

Serial No.	Area.	Crop.	Manure.			Value of manure per acre.	Irrigated or not.	Yield per acre.	Value of produce.	Profit or loss per acre due to manure.	Remarks.
			Kind.	Quantity.							
				Per plot.	Per acre.						
	A. g.			Lbs.	Lbs.	Rs. a. p.		Lbs.	Rs. a. p.	Rs. a. p.	
1	1 0	Tobacco.	1 Ammonium Sulphate.	50	50	9 2 8	Irrigated.	675	112 8 0	—31 7 4	Damaged by stem-borer and frost.
			2 Potassium Sulphate.	50	50						
2	0 11	Do. ...	Castor Cake ...	165	600	3 1 6	Do. ...	1,102½	183 12 0	+27 8 6	
3	0 11	Do. ...	Nil ...	Nil.	Nil.	...	Do. ...	978¾	153 2 0	...	

The results cannot be compared this year as the plants were damaged by stem-borers and the growth was uneven.

An addition of 3 rupees worth of castor cake has given an increased yield worth Rs. 30-10-0.

74. The following is a list of appendices :—

Appendix A.—Water requirements of the crops.
Appendix B.—Analyses of manures used on the Farm.
Appendix C.—Analysis of the water of the Farm well used for irrigation purposes.
Appendix D.—Seed distribution.
Appendix E.—Distribution of implements.
Appendix F.—Distribution of manures.
Appendix G.—Visitors during the year (1908-09).
Appendix H.—Statement of inquiries.
Appendix I.—Note on Farm crops *versus* Cultivators'.
Appendix J.—Demonstrations.

T. F. MAIN,
Deputy Director of Agriculture.

APPENDIX A.

Water requirements of the Crops.

The following table gives the details of the quantity of water taken by several crops during the year per acre :—

Serial No.	Crop.	Quantity of water at the time of sowing.	Quantity of water at the 1st watering.	Quantity of water at the 2nd watering.	Total number of waterings.	Total quantity of water applied.		Rainfall during the period in inches.	Total quantity of water in inches of rainfall.
						In gallons.	In inches of rainfall.		
		In gals.	In gals.	In gals.			Inches.	Inches.	Inches.
1	Tobacco ...	Nil.	41,376	43,876	3	118,328	5·28	3·48	8·76
2	Rice ...	Nil.	136,419	113,794	2	250,213	11·17	17·06	28·23
3	Potatoes ...	41,800	24,700	24,525	9	259,525	11·58	Nil.	11·58
4	Wheat ...	52,000	52,100	57,850	7	875,950	15·20	Nil.	15·20

APPENDIX B.

The following statement gives the details of analysis of manures used on the Farm :—

No.	Kind of manure.	Nitrogen.	Phosphoric acid.	Potash.	Remarks.
		Per cent.	Per cent.	Per cent.	
1	Farm yard manure ...	0·87	0·60	0·98	
2	Castor cake	5·14	2·11	1·78	
3	Nitre	4·12	...	10·56	22·66 per cent. Nitre.
4	Sodium nitrate	6·35	...	...	38·49 per cent. Sodium nitrate.
5	Ammonium sulphate ...	10·90	...	...	51·32 per cent. Ammonium sulphate.
6	Potassium sulphate ...	...	...	49·50	91 53 per cent. Potassium sulphate.
7	Potassium chloride ...	...	...	45·04	71·26 per cent. Potassium chloride.
8	Superphosphate	...	15·81	...	34.55 per cent. Tricalcic phosphate.
9	Basic slag ...	...	13·39	...	29·26 per cent. Tricalcic phosphate.
10	Mowra cake	2·82	0·78	1·64	
11	Karanj cake	4·51	0·89	1·60	
12	Nim leaves	0·23	1·88	2·23	

APPENDIX C.

The following statement gives the details of analysis of the water of the Farm well used for irrigation purposes :—

Ingredients.	Parts per 100,000.
	Per cent.
Calcium carbonate	16·19
Magnesium carbonate ...	18·71
Magnesium sulphate ...	19·22
Sodium sulphate	1·67
Sodium chloride	74·25
Sodium nitrate	9·76

APPENDIX D.

The following statement shows the details of seed distributed :—

Name of article.	Quantity in lbs.	Places where distributed.
	Lbs.	
Local Bájri ...	250½	Dhulia, Poona, Ahmednagar, Nadiád Chikodi, Piplod, Nágpur, Kamla, Alajda and Pálitána
Málbandro Bájri ...	15	Poona.
Bhávnagri Bájro ...	12	Ahmedabad, Poona.
Awned Bájri ...	1	Pálitána.
Natal Bájri ...	8	Dhulia, Ahmedabad, Poona and Pálitána.
Bulrush Bájri ...	15	Dhárwár, Jalálpore, Dhulia, Hissár, Baroda, Chikodi, Poona and Pálitána.
Sundhia Jowár ...	16,717½	Dhulia, Jalálpore, Songir, Dhárwár, Sáháranpur, Mánjri, Poona, Surat, Sángli, Pálitána, Amreli and Mirpurkhás.
Dudia Jowár ...	2	Ahmedabad and Pálitána.
Farfaria Jowár ...	1	Pálitána.
Kamod Paddy ...	416	Calcutta and Nágpur.
Eláychi Paddy ...	15	Nágpur.
Jirásál Paddy ...	16	Nágpur.
Pankháli Paddy ...	16	Nágpur.
Kodra ...	15½	Ahmedabad, Nágpur and Amreli.
Bávto ...	5½	Nágpur and Amreli.
Tal ...	2	Ahmedabad.
Banti ...	½	Amreli.

APPENDIX D—*continued.*

Name of article.		Quantity in lbs.	Places where distributed.
		Lbs.	
Kuri	...	½	Ahmedabad.
Cheno	...	½	Amreli.
Jiru	...	⅛	Vánsda.
Variáli	...	3⅛	Vánsda and Ahmedabad.
Cai-sen	...	1	Dhárwár.
Cai-trang	.	1	Dhárwár.
Niger seed	...	2	Ahmedabad.
Tuer	...	27	Surát, Dhárwár, Mália, Nágpur, Ahmedabad, Kamla, Poona and Pálitána.
Ambádi seed	...	23	Nágpur, Ahmedabad and Kamla.
San seed	...	125	Mália, Ahmedabad and Karáchi.
Jute	..	5¾	Ahmedabad, Mátar and Mália.
Chola	...	2½	Nágpur, Dhárwár and Ahmedabad.
Udid	...	2	Nágpur and Dhárwár.
Math	...	12	Nágpur, Kamla, Dhárwár and Ahmedabad.
Mug	...	4	Nágpur, Ahmedabad and Dhárwár.
Guwár	...	22½	Jalálpore, Kamla, Alajda, Poona and Hebli.
Bhinda seed	...	18	Poona and Belgaum.
Raddish seed	...	7	Poona and Dohad.
Turia seed	...	2	Poona.
Brinjals seed	...	1	Poona.
Garlic seed	...	10	Dohad.
Dhudhi seed	...	⅛	Dohad.
Mogri seed	...	¾	Poona and Dohad.
Onion seed	...	2⅛	Dohad and Mundgod.
Kareli seed	...	¾	Dhulia, Dohad and Poona.
Carrots seed	...	2	Dohad.
Tobacco seed	...	3½	Poona, Ahmedabad, Bávla, Jalálpore and Kashmere.
Wágad seed	...	11	Surat, Ahmedabad and Kirkee.
Lálio seed	...	78	Ahmedabad, Herara and Kirkee.
Rozi seed	...	21	Surat, Kamla and Kirkee.
Buri seed	...	1	Pálitána.
Bourbon seed	...	19¾	Surát, Thána, Pálitána, Nadiád, Mátar, Ahmedabad and Dohad.
Spence cotton seed	...	7	Surat, Ahmedabad and Pálitána.
Abassi seed	...	17½	Undra, Ahmedabad and Bávla.
Castors	...	10	Poona.
Safflower seed	...	1½	Dhárwár and Amreli.
Wheat Popatia	...	165	Nadiád.
Sugar-beet seed	...	...	Poona.

APPENDIX E.

The following statement gives the details of implements distributed :—

Name of article.	Number.	Places where distributed.
Hand chaff cutters ...	6	Dadva, Surat, Nadiád, Bákrol and Dehrol.
Iron ploughs ...	7	Roho, Sátára, Chhárodi and Nadiád.

APPENDIX F.

The following statement gives the details of manures distributed :—

Name of manure.	Quantity in lbs.	Places where distributed.
	Lbs.	
Ammonium sulphate ...	248¾	Manjipura and Dabhán.
Potash sulphate ...	100	Dabhán.
Potash chloride ...	155	Manjipura and Dabhán.
Basic slag ...	59	Dabhán.
Nitre ...	94	Dabhán and Dhulia.
Safflower cake ...	2,560	Bárámati.

APPENDIX G.

The station was visited by 503 persons. The following table shows the details of visitors who visited the station during the year 1908-09 :—

	Cultivators.	Non-cultivators.	Officers.	Total.
Number of persons ...	431	43	29	503

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909/10

Department of Agriculture, Bombay.

ANNUAL REPORT
ON THE
EXPERIMENTAL WORK
OF THE
NADIAD AGRICULTURAL STATION
(Kaira District, Gujarát)

FOR THE YEAR

1909-1910

BY

T. FORSTER MAIN, Esq., B.Sc., etc.,
Deputy Director of Agriculture, Bombay Presidency.

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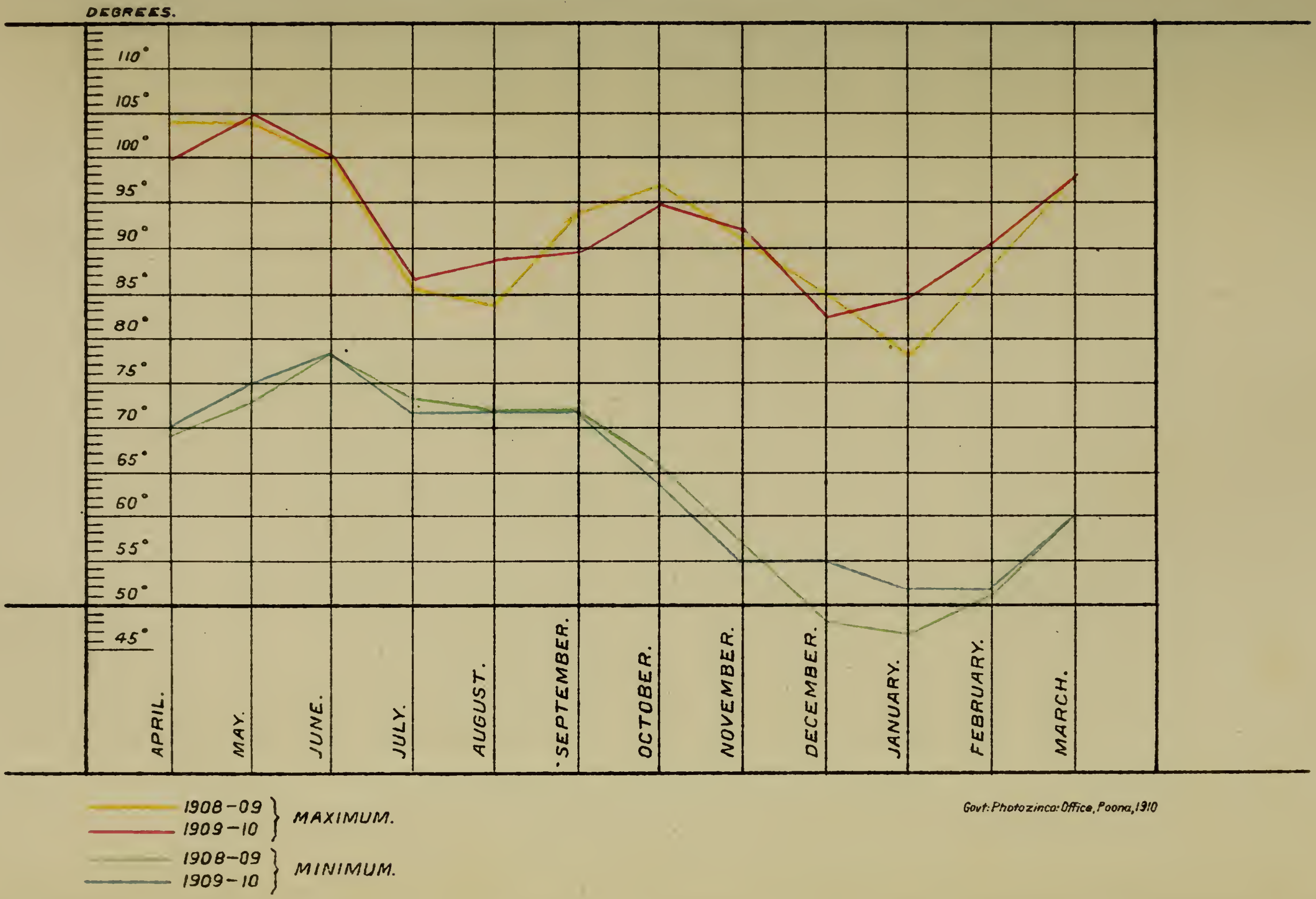

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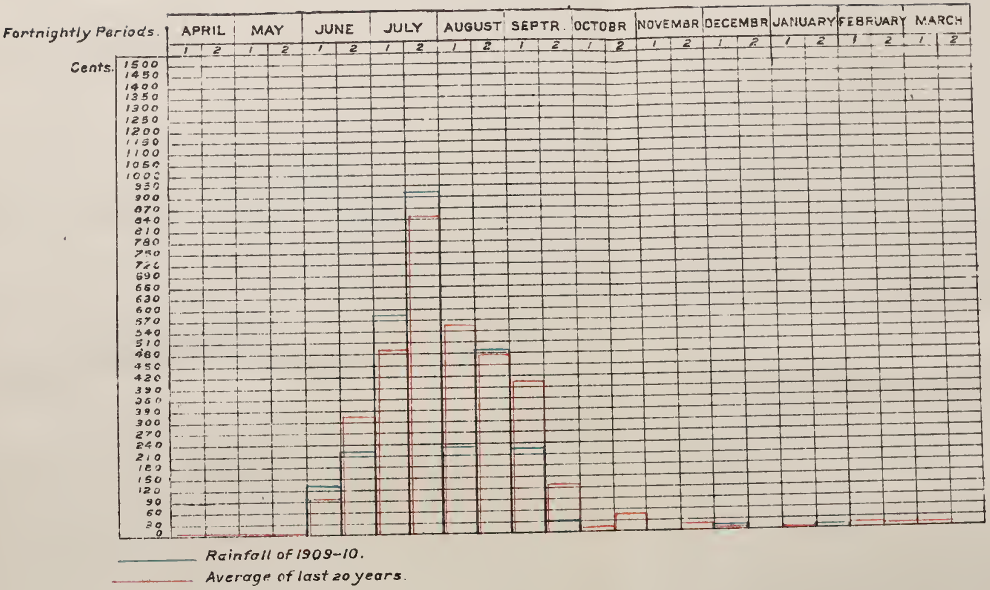

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THE NADIA'D AGRICULTURAL STATION, 1909-1910.

Established in 1903; *North Latitude* 22°; *East Longitude* 73°; *Elevation*—Approximately sea level; *Soil*—Alluvial loam (Var. Gorádu); *Average Rainfall*—33 inches 57 cents; *Temperature*—Maximum 112° in May, Minimum 41° in January.

Area.—44 acres.

Superintendent.—Mr. Dattatraya Hari Tagare.

2. *Season.*—The monsoon set in on the 8th June when there was a shower of rain which, however, was insufficient to allow of a commencement being made with sowing operations. It, however, facilitated preliminary tillage operations. A good shower of rain fell on the 28th June and sowing operations were started at once. The germination of all the crops except til was good. July and August were very wet months but there were no injurious heavy rains as was the case in the preceding year, the heaviest fall in one day being 3·3 inches on the 16th July. The rains at the beginning of September did some damage to the bájri crop by washing off the pollen from the ear-heads. The September rainfall was insufficient for the rice crop. There was a good opportunity in the month of August for transplanting tobacco. Early transplanted tobacco lost 3 to 4 bottom leaves in the cold weather which was ascribed by cultivators to be due to too much moisture in the early stages. As the farm tobacco was transplanted somewhat late it did not suffer in this respect. The season on the whole was a good one but crops did not yield so well as was expected.

3. For convenience the work of the station is referred to under the following sections :—

Section I.—Crop experiments,
Section II.—Manurial Experiments,
Section III.—Cultural Experiments,
Section IV.—Rotational Experiments,
Section V.—Miscellaneous work,

while several appendices are added.

The several analyses referred to throughout this report were kindly made by the Agricultural Chemist.

4. In addition to managing the farm Mr. Tagare assisted in organizing and conducting demonstrations at Nadiád, Broach and Ahmedabad. He also furnished advice in reply to a number of inquiries on agricultural questions the more important of which with the replies are included in Appendix II. The Superintendent also arranged for several experiments conducted outside the farm.

SECTION I.—CROP EXPERIMENTS.

Tobacco.

5. *Varieties.*—Experiments in the past have been confined to Cigar wrapper types, such as Java, Sumatra and Florida tobaccos. Experience, however, indicates that the conditions prevailing in Northern Gujarát are not favourable for producing leaf with the special characteristics demanded for such a purpose and it has been found that new varieties soon deteriorate by producing thick, coarse leaves similar to those of the local variety and this is not likely to be due to natural cross fertilization with the local variety as precautions are taken every year to protect the inflorescences. It has been decided to make trials with American and Turkish tobaccos which are suitable for cigarette and pipe purposes and seed has been obtained for this purpose of several varieties which will be grown next season. There is now a great Indian demand for cigarettes of inferior quality and it may be possible to produce leaf suitable for this market.

6. *Curing.*—Experiments are being continued in the curing of the tobacco leaf in the barn. Samples have been forwarded to the Imperial Institute and also to the Rangpur Tobacco Company in Bengal. The report of the Imperial Institute stated that in some respects these samples of tobacco showed a marked improvement on the samples sent in the preceding year. The nicotine was low in all the samples analysed ; the total nitrogen was also satisfactorily low and the amount of ash well within the range of that found in commercial tobaccos of the same type. It was pointed out, however, that the composition of the ash was most unsatisfactory being abnormally low in potash in all four cases, much too high in lime in the case of No. III and rather too high in two of the other samples.

7. It was stated that the ash from tobacco of good quality usually contains 20 per cent. of potash, whereas the best of the samples submitted contained only 9·6 per cent. of potash and that of the others contained much less. The sulphuric acid was also stated to be too high in all four cases but it was very satis-

factory that only a trace of chlorine was present. The samples were found to burn poorly and this was reported to be due to the lack of sufficient potash and the presence of excess of lime and sulphuric acid. The samples were said to conform more closely in shape and colour of leaf to the American pipe tobaccos which are in large demand in England and that they had lost the rather coarse character of leaf which is generally regarded as typical of Indian tobaccos. It was further pointed out that the other defects, besides the poor burning character, such as black ash and undesirable flavour would no doubt disappear if the burning quality was improved because these defects are in part due to incomplete combustion of the tobacco. In the matter of preparation the colour was considered fairly good on the whole.

8. The Rangpur Company thought the samples too thick and coarse in the leaf for cigarette purposes and too strong in flavour but that the colour was not unsuited for such a purpose. The Company further pointed out that the American tobaccos, *viz.*, white Burly, yellow Prior, Flemingen and Little Orinico, etc., which they were cultivating at Rangpur, are very mild, of silky texture, of golden colour and good flavour and that such tobacco was liked by the general public while the Turkish tobaccos, *viz.*, Carala, Sari and Scented leaf, are a little stronger, of reddish colour, possessing a peculiar sweet aroma which is much liked by the high class people. It was also pointed out that topping and suckering made the leaf thick and strong and that neither of these operations should be carried out on tobacco intended for cigarette purposes but that topping might be practised in the modified form of removing the flowers when these formed. It was further stated that the colour depends entirely upon the method and care that are taken in curing and that the best golden colour could only be secured by fire curing.

9. There is no provision at Nadiád for fire curing but the chief difficulty experienced in barn curing has been the extreme dryness of the atmosphere. In the season under report a steam generator has been installed and steam introduced into the barn. In this way it was found possible to regulate the humidity fairly well.

10. *Cultivation under shade.*—Experiments were continued with Florida and Sumatra varieties. The plants grew very tall some attaining a height of 9 feet. The leaves were very thin in texture. This work, however, will not be proceeded with as attention is to be confined to an effort to produce a leaf suitable for cigarette or pipe purposes.

Cotton.

11. Bourbon is the only tree cotton which has given promising results. This cotton is a perennial and the outturns obtained last season which was the first and this season which is the second year's growth with two varieties of Bourbon are summarized below. In the year under report the plants were pruned at the end of the hot weather in June and it will be noticed that the outturns of the second year compare well with those obtained in the first :—

No. of Plot.	Area of plot in acres.	Name of variety.	Results in 1908-09.			Results in 1909-10.		
			Yield per acre in lbs. of Seed Cotton.	Value of produce per acre in rupees.	*Cost of production in rupees per acre.	Yield per acre in lbs. of Seed Cotton.	Value of produce per acre in rupees.	Cost of production in rupees per acre.
				Rs. a. p.	Rs a. p.		Rs, a. p.	Rs. a. p.
57	·25	Bourbon (10 T.) ..	568	53 4 0	48 3 6	564	62 10 8	27 2 4
58	·25	Bourbon (23 T.) ..	376	35 4 0	56 2 10	524	53 3 4	27 2 4

12. A sample of 23 T was valued by the Bombay Cotton Trades Association as follows "Rs. 340 nice style, good strong staple" while the firm who valued for the Imperial cotton specialist reported as stated in paragraph 15 of this report. These valuations should be compared with that of fine machine ginned Navsári cotton which stood at Rs. 360 per khandi of 784 lbs.

13. The most promising of the hybrid cottons mentioned in paragraph 13 of last year's report were continued in the season under report. Fresh seed was again sown in addition to the plants kept over from last year to see whether they would show perennial habits as one of their parents, *viz.*, the Bourbon variety is a perennial one. None of these hybrids, however, appear to do well in the second season as their yields were poor and they seem to have the characteristics of annuals. The crops raised from fresh seed yielded fairly in the case of the American (Texas)—Bourbon crosses but the Egyptian (Abassi)—Bourbon crosses did poorly as was the case last season and they do not seem to be suited to the conditions prevailing at Nadiád.

14. Last year these hybrid cottons were sown at the beginning of the monsoon and irrigated three times after the conclusion of the rains. In the season under report these cottons were sown in May and irrigated three times before the monsoon set in. This was done with the object of getting the plants well established before the rains commenced, so that they would not be damaged

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* The cost of production has been reduced by Rs. 31-3-6 the value of the Bhendi crop sown in each plot.

but on the contrary derive the maximum amount of benefit from monsoon rains which are often very heavy in the early part of the season. No irrigations were given after the rains were over. The results obtained in the season under report with the new crop sown in May are tabulated below. The cost of cultivation was Rs. 71-12-3 (less Rs. 22-2-6 for sale of Bhendi) per acre :—

Plot No.	Area in Gunthas.	Register number.	Name of cross.	Ginning percentage.	Seed cotton per acre in lbs.	Remarks.
69	10	1367	Texas x Bourbon (13T)...	26·9	536	Growth vigorous.
70	10	1371	Texas x Bourbon (35T) ..	28·1	284	Growth vigorous but there were not many bolls.
79	10	1368	Texas x Bourbon (15T)...	28·7	652	Growth vigorous.
80	5	1380	Abassi x Bourbon (21T)...	27·7	104	Growth vigorous but there were not many bolls.
80	5	1379	Abassi x Bourbon (20T) ..	28·7	136	Do.

15. Samples of these cottons were sent for valuation* to Bombay Cotton Trades' Association and to the Imperial Cotton Specialist. The Cotton Trades' Association reported as follows on hybrids 1367, 1368, 1379 and 1380:—

> "These have all long silky staple and compare favourably with Egyptian (at 13 *d*), but it is impossible to say what the value is here."

The firm who valued for the Imperial Cotton Specialist reported as follows:—

> Hybrid 1367.—"As Texas has deteriorated and is dull in appearance, but has maintained its length of staple; value Rs. 375."
>
> Hybrid 1368.—"Same as above; value Rs. 375."
>
> Hybrid 1379.—"As Abassi Egyptain, it shows considerable deterioration in colour and staple and is equal to the above; value Rs. 375."
>
> Hybrid 1380.—"Inferior to the above three; value Rs. 360."

For comparison with the above valuations a sample of Bourbon (23 T) one of the parents of each of the above hybrids was reported upon as follows:— "Shorter in length of fibre than the four hybrids but it is slightly better in colour and is silky to the feel; value Rs. 360." It will therefore be seen that all the hybrids except No. 1380 show an improvement in the quality of their lint over their Bourbon parent although they have not attained to the quality of their American or Egyptain parents, as the case may be.

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* At the time of valuation fine machine ginned Navsári was worth Rs. 360 per khandi of 784 lbs.

16. *Selection.*—Plant to plant selection was made in hybrids 1367 and 1368 when one plant in the former and four plants in the latter hybrid were found to possess superior fibre and seed from each of these plants will be sown separately in season 1910-11.

17. *Hybridization.*—A few new hybrids were obtained during the course of the year. These are crosses between Egyptian Abassi and American Texas Bur and American King's improved. The results are tabulated below :—

Name of male Parent.	Name of female Parent.	No. of successful bolls obtained.
Abassi	Texas Bur	13
Do.	King's improved	12
Texas Bur	Abassi	8
King's improved	Do.	11

Wheat.

18. A number of varieties of wheat were tested on a fairly large scale. The growth of all the varieties was very good but there was a most severe attack of rust in the late stages of the crop's growth which greatly affected the yield. In this respect the local varieties Dhola Katha and Wagia suffered more even than the new varieties. Shet Parner was one of the least affected. The yields obtained are tabulated below :—

Serial No.	Name of Variety.	Yield per acre in lbs.	
		Grain.	Fodder.
1	Lal Kasarwali	1,216	4,416
2	Daudkhani of Delhi	1,568	4,352
3	Australian No. 27	466	3,008
4	Muzaffarnagar	484	5,182
5	Red Khadir	1,280	3,549
6	Tamra	1,501	3,840
7	Shet Parner	1,181	4,384
8	Hybrid of Nagpur and Muzaffarnagar.	768	5,472
9	Red Deshi of Oudh	1,181	4,416
10	Pamar of Shirsa	752	4,064
11	Australian Hybrid	1,181	4,736
12	Walttaar	107	5,408
13	Dhola	320	4,064
14	Katha	137	4,512
15	Wajia	960	3,731

19. A sample of Shet Parner was valued by Messrs. Ralli Brothers of Bombay at Rs. 6-6-6 per cwt. which compares very favourably with the valuations of the same wheat grown at Dohad and other farms. Lal Kasarwali, a Punjab wheat produced the largest number of spikelets per ear-head while Walttaar a South African exotic tillered very freely producing about 16 stems per plant and its yield of straw—5,408 lbs. per acre, is consequently very high, but its grain yield is very low owing to its late maturing character and it remains for further investigation to ascertain whether an early maturing strain can be evolved. Shet Parner also tillered well. Daudkhani of Delhi has given a fair outturn of grain.

20. Selection is being conducted with the object of increasing the yield per acre by improving the size of the ear-heads increasing the tillering capacity and by separating out plants which become least attacked by rust so as to obtain rust resistant strains.

Bájri.

21. Comparative trials of bájro, Natal bájri and Bulrush millet with local bájri were vitiated owing to rain at the flowering time washing off the pollen from the ear-heads. Selection is being carried on with the objects of securing a pure strain because bájri is very subject to natural cross fertilization in the field. Efforts are also being made to improve the size of the ear-head and the quality of the grain.

Pulses.

22. A few varieties of tur were grown in comparison with the local varieties. The Bangalore variety (an arhar) which possesses larger pods and grain than the local turs also gave a higher outturn in the year under report. Two similar varieties, *viz.*, Bilaspur and Sambalpur, to Bangalore did not give good outturns. A variety received from Indo-China did fairly well. The results are tabulated below :—

Name of Variety.	Yield per acre in lbs.	
	Grain.	Bhusa.
Sambalpur	400	386
Bangalore	1,013	1,413
Bilaspur	538	746
Red Local	933	436
White Local	960	1,306
Indo-China	933	1,304

23. *Selection*—The local variety consists of a mixture of (1) white podded, (2) black podded, and (3) mottled podded types, while there are two principal types of grain *viz*: red and white. The three types of pods have been separated and the seed from each will be sown separately next season to see how far this characteristic comes true and if so to ascertain whether one of these types is superior to the others in point of quality or yielding capacity.

24. *Guvar.*—There are four kinds of guvar generally grown in Northern Gujarát. These are:—

1. *Pardeshi.*—This variety has a fleshy, straight, long pod which is not fibrous. The grain is large, flattened and somewhat kidney shaped. This variety is grown chiefly for vegetable purposes and cultivators sprinkle a few seeds in their bájri and kodra mixtures. This variety is grown by Vagharis in their small gardens.

2. *Wankadia.*—This variety is similar to the above one except that the pod is a little curved. It is also grown for vegetable purposes.

3. *Telia.*—The pod is tender having a bright colour and a long slender shape. This is also a vegetable and is generally grown mixed with the two preceding varieties. It is considered the best of the three.

4. *Sotia.*—The pod of this variety is small, thin and fibrous. The grain is small and somewhat square. The plant grows straight up without much branching. This variety is exclusively grown for its grain and is cultivated either alone or mixed with kodra and bajri. The grain is fed to cattle and makes an excellent concentrated food. This variety is also grown in the beds of turmeric, ginger, suran and sugarcane crops, etc., in order to shade the young plants. Pure seed of each of these varieties has been selected.

25. *Wal.*—Several varieties of Assam wals were tried again in the year under report. All of these wals appear to be late in coming to maturity and hence their outturns did not compare favourably with that of the local variety. In the early stages the crop did well but as the flowers came late there was not sufficient moisture left in the soil to enable the pods to set. The results are tabulated below:—

Name of Variety.	Yield per acre in lbs.		Remarks.
	Green pods.	Grain.	
Local	933	126	Growth vigorous.
Adhasati	733	8	Do. quite similar to Local.
Paikasari	801	122	Growth vigorous, but pods were not formed.
No. 7 Short Red ...	14	2½	Growth vigorous, much of the area was damaged by wilt.

26. Chola (Vigna Catiang)—Seed of the following varieties has been selected separately:—

(1) White large.
(2) White small.
(3) White extra superfine.
(4) Red small.
(5) Red large.
(6) Large.
(7) Large Devgad Baria—and these will be grown on a fairly large scale next season.

Oil Seeds.

27. *Castors.*—Several varieties were grown for selection purposes. Their analyses are summarized below from which it will be seen that the local large tree-like variety *Motad Paras* and a variety from Madras, head the list with 54·14 per cent. of oil:—

No.	Name of variety.	Percentage of oil.	Remarks.
1	Indapur ...	51·76	
2	Dharwar small ...	51·74	
3	Do. big ...	50·17	
4	Do. Full grown ...	51·84	
5	Mota paras ...	54·14	
6	Paras ...	47·53	
7	Chane ...	49·64	
8	Moti chane ...	49·29	
9	Dindori ...	50·59	
10	Purple stemmed ...	49·99	
11	Karjat ...	50·62	
12	Madras ...	54·14	
13	Nimar ...	......	

28. *Til.*—The following varieties were grown for seed selection. The statement below gives their percentage of oil from which it will be seen that the black local heads the list with 56·23 per cent :—

No.	Name of variety.	Percentage of oil.	Remarks.
1	Black Local ...	56·23	
2	Black Canara ...	52·95	
3	Haveri ..	49·80	
4	White Local ...	48·21	
5	White Baroda ...	47·86	

Sugarbeet.

29. This crop was again grown on a small scale. Three varieties, *viz.*, one German and two French varieties were tried. The French varieties yielded at the rate of 30,000 lbs. per acre and the roots of one of these contained 13·27 per cent. of sugar. The German variety yielded somewhat less. The cost of production worked out at Rs. 74-6-0 per acre of which Rs. 30 went on irrigation. The crop required six irrigations and as the water had to be raised from deep wells, this item of expenditure is heavy. The chief obstacle in the way of this crop being taken up however is the fact that the refining of the sugar is a process which requires an extensive outlay for machinery and a high degree of supervisionary skill, because the juice of the beet is extracted with difficulty, and contains large quantities of mineral salts which render the crude sugar and molasses made therefrom bitter and unpalatable, and hence the manufacture of beet sugar cannot be done on a small scale as in the case with cane.*

30. Messrs. Bramness and Sons of Philadelphia, United States of America, who make a speciality in the manufacture of starch from potatoes, Cassava and other products inform me that recently there has been perfected a process and machinery by which it is possible to make sugar from beets on a small scale as cheap as on a large scale but that firm is not yet prepared to recommend the same until further tests have been made.

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* *Vide* the Farmers Encyclopedia of America published in 1904 by Orange Judd and Co., New York.

Tapioca.

31. Cuttings of this crop were planted in July on a piece of slightly low lying land of a sandy nature The rains as previously mentioned were abundant in the months of July and August. The crop was never irrigated and the tubers were dug out in May but they proved to be small in size as might have been expected from the lack of vigour in the plants. The crop was damaged by wild pigs which dug out several of the tubers. The average weight of green tubers per plant was 2 lbs., the dry weight being two-thirds of a pound. The conclusions arrived at are, that this crop when grown on cultivated land does not give as much return as the locally cultivated crops such as bájri, while if planted on waste areas the damage from wild pigs is likely to be very great.

Crop Pests.

32. The most destructive insect pests during the year were Katra hairy caterpillars (Amsacta lineola) and white ants (Termites). The Katra caterpillars appeared in enormous numbers during July and destroyed the young crops of bajri, til and kodra, etc. The farm crops suffered less than those of surrounding cultivators. Even the road-side trees were left leafless and it was impossible to walk through the fields without killing thousands of them under one's feet. White ants continued to do a great deal of damage to cotton, wheat and other crops.

33. There was a very severe outbreak of wheat rust on the farm in the season under report and in the Ahmedabad district where irrigated wheat is grown, the crop was very badly damaged so much so that the yield in many fields was not even at the rate of 2 annas.

SECTION II—MANURIAL EXPERIMENTS.

Manurial Experiment No. 1.

34. In this experiment several artificial manures are tested to ascertain whether they can in part be substituted for the heavy dressings of Farm yard manure usually applied to tobacco. The experiment is carried out both with deep and shallow cultivation.

35. The results obtained in the season under report are tabulated below from which it will be seen that in every instance the deep cultivated plots have yielded better than those receiving shallow cultivation by amounts ranging from 60 to 184 lbs. per acre. The extra cost of cultivation in the case of the deep ploughed plots amounts to about Rs. 2 per acre while the increased profit runs from Rs. 5 to Rs. 15-5-4 per acre.

36. The most economical method of manuring seems to be a combination of farm yard manure and castor cake. By substituting 10,000 lbs. of farm yard manure by 600 lbs. of castor cake an increased net profit of Rs. 35-3-4 has been secured in the case of the shallow ploughed plot and Rs. 25-7-1 in the case of the deep ploughed plot. Thus the manure seems to have been relatively more effective on the shallow cultivated plots—which is contrary to the observation made on this point in paragraph 3 of the 1907-08 report.

37. Castor cake used alone without any farm yard manure does not appear to be a suitable manurial treatment for tobacco for the plants on the plots manured in this way did not "fix" well when transplanted and this would adversely affect the yield. The nitrogenous manures nitre and nitrate of Soda have not produced any marked effects upon the crop but in the case of both of these manures deep ploughing has apparently enhanced their values.

38. It was further observed that in the case of the plots manured with farm yard manure supplemented with castor cake the tobacco leaf cured very well while the tobacco produced with castor cake only was inferior in point of flavour which may be accounted for by the moisture holding capacity of farm yard manure when the latter is present.

Statement showing the results of different manures upon the tobacco crop.

Shallow cultivation.							Remarks.
No. of plot.	Area in Gunthas	Manure.		Outturn per acre in lbs.	Value of produce per acre in rupees.	Cost of production per acre in rupees.	
		Kind.	Quantity per acre.				
					Rs. a. p.	Rs. a. p.	
1	10	Farm Yard Manure ...	15 tons ...	1,732	144 5 4	89 10 0	
2	10	Castor Cake ...	2,000 lbs. ...	1,744	145 5 4	99 10 4	
3	10	Farm Yard Manure ... + Castor cake ...	10 tons .. + 600 lbs.	2,244	189 0 0	97 1 4	
4	10	Farm Yard Manure ... + Nitre ...	10 tons ... + 112 lbs.	1,916	159 10 8	88 5 8	
5	10	Farm Yard Manure ... + Sodium nitrate ..	10 tons ... + 112 lbs.	1,852	154 5 4	91 8 8	
141 B	6	Farm Yard Manure ... + Ammonium sulphate ...	10 tons .. + 112 lbs.	2,120	176 10 8	87 12 6	

Statement showing the results of different manures upon the tobacco crop—continued.

Deep cultivation.							
No. of plot.	Area in Gunthas	Manure.		Outturn per acre in lbs.	Value of produce per acre in rupees.	Cost of production per acre in rupees.	Remarks.
		Kind.	Quantity per acre.				
					Rs. a. p.	Rs. a. p.	
12	10	Farm Yard Manure ...	15 tons ..	1,916	159 10 8	90 15 4	Growth vigorous leaves broader and well spotted.
13	10	Castor Cake ...	2,000 lbs. ...	1,836	153 0 0	102 9 8	Growth poor in the beginning.
14	10	Farm Yard Manure ... + Castor cake ...	10 tons ... + 600 lbs.	2,220	193 5 4	99 2 8	Growth vigorous ; leaves cured very well.
15	10	Farm Yard Manure ... + Nitre ...	10 tons ... + 112 lbs.	1,976	164 10 8	90 3 0	Do.
16	10	Farm Yard Manure ... + Sodium Nitrate ...	10 tons ... + 112 lbs.	1,924	160 5 4	93 8 4	Do.
141 A	6	Farm Yard Manure ... + Ammonium sulphate ...	10 tons ... + 112 lbs.	1,653	135 8 10	54 14 0	Do. but in plot 141 A the growth was poor and flavour not good.

Manurial Experiment No. 2.

39. In this experiment the value of green manure as a manure for tobacco is tested. Sann provides the green manure and it is tried both when tobacco is grown every year continuously and also when tobacco is taken in alternate years with kodra mixtures. The general scheme of the experiment is explained in paragraph 31 of last year's report. The experiment is conducted both upon deep and shallow cultivated plots. The results obtained in the year under report are tabulated below:—

Plot No.	Area in Gunthas	Crop.	Tillage.	Manure kind.	Results per acre.			Rotation to the tobacco crop.	Remarks.
					Outturn in lbs. of cured tobacco.	Value of produce in rupees.	Cost of cultivation in rupees		
						Rs. a. p.	Rs. a. p.		
23	10	Tobacco .	Ordinary ...	Green Manure of Sann.	1,652	139 10 8	73 5 8	No rotation	Growth poor.
34	10	Do. ...	Deep ...	Do. ...	1,732	144 5 0	75 9 0	Do. ...	
24	10	Do. ...	Ordinary ...	Do. ...	1,620	135 0 0	53 12 0	Kodra Mixture.	Growth better than the above.
35	10	Do. ...	Deep ...	Do. ...	1,592	132 10 8	57 9 4	Do. ...	
26	10	Do. ...	Ordinary ...	Farm Yard Manure.	1,596	133 0 0	83 15 4	Do. ...	Growth vigorous leaves cured well.
37	10	Do. ...	Deep ...	Do. ...	1,608	134 0 0	86 6 8	Do. ...	

40. The yields on plots 23 and 34 should be compared with those obtained on plots 1 and 12 of the preceding experiment from which it will be seen that sann does not compare well with farm yard manure upon tobacco grown continuously. A comparison between the yields obtained on plots 24 and 35 with those obtained on plots 25 and 37 shows very little difference but in both cases these yields are a good deal below those obtained in experiment No. 1 and also on plots 23 and 34 of this experiment in which tobacco is grown continuously and hence the inference is that a rotation is not good for this crop.

It was observed that the ripe leaves of the tobacco produced on the green manure plots were not properly spotted while the cured leaf was inferior in flavour.

Manurial Experiment No. 3.

41. This experiment is really a part of experiment No. 2 and consists of the residual effects of the green manure and farm yard manure upon the rotation crops of kodra mixture. The results are tabulated below from which it will be observed that the farm yard manure has left a better residue than the green manure and given an increased net profit of from Rs. 9 to Rs. 13 per acre. The yield of kodra mixture has done better on the plots which in the previous year were not deep ploughed :—

Ordinary ploughing.						Deep ploughing.					
Plot No.	Crop.	Yield per acre.		Value of produce.	Cost of cultivation.	Plot No.	Crop.	Yield per acre.		Value of produce	Cost of cultivation.
		Grain.	Fodder.					Grain.	Fodder.		
				Rs. a. p.	Rs. a. p.					Rs. a. p	Rs. a. p.
				Green	*manure*						
25	Kodra ...	1,696	3,608	62 5 8	21 13 0	36	Kodra ...	1,176	2,740	52 7 4	21 13 0
	Tal ...	4	...				Tal ...	18	...		
	Tuer ...	332	468				Tuer ...	324	448		
	Sheria ...	128	68 Fibre.				Sheria ..	140	78 Fibre.		
				Farm	*yard*	*manure.*					
2	Kodra ...	2,000	3,756	72 12 4	22 9 0	38	Grain. 2,040	Fodder. 3,016	...	66 2 8	22 9 0
	Tal ...	4	...				1½	...			
	Tuer ...	264	416				292	440			
	Sheria ...	260	Fibre. 92				148	Fibre. 48			

Manurial Experiment No. 4.

42. In this experiment two problems are under investigation. The first is to compare the relative values of green manure and farm yard manure upon the potato crop and its rotation

crops of bájri and sundhia jowár and the second object is to compare the relative profits of taking three crops in one year and two years respectively. The experiment is conducted both upon deep ploughed plots and ordinary (country method) cultivated plots.

43. The results obtained in the year under report are tabulated below except in the case of potatoes which crop proved a failure owing probably to the deleterious effects of the saltish irrigation waters which are used for watering this crop and also perhaps to the ill effects of too much irrigation upon the soil texture and it has been decided to discontinue the cultivation of this crop. It will be observed that in this experiment also the residual effect of farm yard manure has given better results than that of green manure upon both bájri and sundhia but the outturn of both of these crops was considerably greater on the plots which were deep ploughed in the preceding year for potatoes.

44. With regard to the taking of three crops in one year the yields on these plots are considerably less than those of the two-year rotation plots but not sufficiently so to make the two-year rotation the more profitable. It would seem, however, that the continuous irrigation consisting of water containing a large quantity of salt 150 parts per 100,000 parts is having an injurious effect upon the land and that the yields on these heavily irrigated plots would go on decreasing until they ceased to return a profit and the experiment will therefore not be continued :—

Ordinary cultivation.								Deep cultivation.							
Group of plots.	No. of plots.	Crop.	Yield per acre.		Value of produce per acre.	Cost of production per acre.		Group of plots	No. of plots.	Crop.	Yield per acre.		Value of produce per acre.	Cost of cultivation per acre.	
			Principal product.	By-product.							Principal product.	By-product.			
			Lbs.	Lbs.	Rs. a. p.	Rs. a. p							Rs. a. p.	Rs. a. p.	
				Farm yard manure.											
I	61	Bájri ...	510	3,852	33 15 4	24 13 0		I	71	Bájri ...	1,320	3,996	31 5 4	24 13 0	
		Potatoes.	Very	poor	crop.					Potatoes	Very	poor	crop.		
		Sundhia .	...	5,624	60 3 0	43 8 10				Sundhia .	...	5,556	55 9 4	43 8 10	
				Green manure.											
II	62	Bájri ...	980	4,708	50 1 8	24 13 0		II	72	Bájri ...	1,280	4,496	61 15 8	24 13 0	
	63	Potatoes.	Very	poor	crop.					Potatoes.	Very	poor	crop.		
		Sundhia .	...	5,084	50 12 8	43 8 10			73	Sundhia .	...	7,140	71 6 4	43 8 10	
				Farm yard manure.											
III	64	Bájri ...	1,224	4,256	59 7 0	19 0 4		III	74	Bájri ..	1,536	4,384	70 5 0	17 0 0	
		Potatoes.	Very	poor	crop.					Potatoes.	Very	poor	crop.		
		Sundhia .	...	6,364	63 9 4	43 8 10			75	Sundhia .	...	7,938	79 12 8	43 8 10	

Manurial Experiment No. 5.

45. In this experiment the relative values of the three cakes castor, safflower and cotton upon tobacco were under trial. The plots received a common dressing of 20,000 lbs. of farm yard manure plus 1,000 lbs. of cake applied as a top dressing. The results are summarised below from which it will be seen that these cake manures have increased the yields by 300 to 400 lbs. per acre which are equivalent to 15 per cent. and 20 per cent. respectively. The yield on the cotton-seed cake plot is the highest but its price is nearly double that of castor cake which is the most available cake manure in Gujarát and has left the highest increased net profit of over Rs. 7 per acre.

46. The colour of tobacco produced on the castor cake plot was, however, not quite so good as that produced on the other plots :—

Name of manure.	Yield per acre in lbs.	Value of produce per acre in rupees.			Cost of production in rupees per acre.			Profit per acre in rupees.			Cost in rupees of additional cake.		
		Rs.	a.	p.	Rs.	a.	p.	Rs.	a.	p.	Rs.	a.	p.
Farm yard manure	2,032	169	5	4	105	12	8	53	8	8	......		
Cotton-seed cake	2,464	205	5	4	105	12	8	68	15	4	30	9	4
Safflower cake	2,368	197	5	4	105	12	8	63	0	0	28	8	8
Castor cake	2,344	195	5	4	105	12	8	70	12	8	18	12	0

Manurial Experiment No. 6.

47. The object of this experiment is the trial of nitre upon the rice crop both when grown as a dry crop and when irrigated. The results obtained in the year under report are summarized below from which it will be seen that the application of one Bengal maund (80 lbs.) of nitre has greatly increased the yield of rice; but as the September rains were deficient for the rice crop in the year under report the outturns of dry crop rice are low and even the irrigated crop yielded below normal. The wheat crop taken in the cold weather proved a total failure owing to a severe attack of rust.

No. of plot.	Manurial treatment per acre.	Crop in rains.	Yield per acre.		Value of produce per acre.			Cost of production per acre.			Irrigated or not.
			Principal product.	By-product.							
			Irrigated.								
	Lbs.				Rs.	a.	p.	Rs.	a.	p.	
94	20,000 F. y. m. + 80 Nitre.	Rice sutarsal.	1,900	3,283	60	8	4	68	4	2	Irrigated.
95	20,000 F. y. m.	Do. ...	1,040	2,056	32	13	4	54	5	0	Do.
			Dry crop.								
90	20,000 F. y. m. + 80 Nitre.	Rice sutarsal.	1,713	2,413	49	8	9	58	2	0	Not
91	20,000 F. y. m.	Do. ...	1,283	2,580	37	6	3	49	3	6	Do.

SECTION III.— CULTURAL EXPERIMENTS.

Cultural Experiment No. 1.

48. In this experiment the advantage or otherwise of deep cultivation for the commonly cultivated kharif crops of Northern Gujarát is under investigation. By deep cultivation is meant ploughing the land once with the large turn wrest (CT2 plough) while by shallow cultivation is meant ploughing with the country wooden plough only. Each plot is $\frac{1}{4}$th of an acre in area. The rotation is a three-year one and 15,000 lbs. of farm yard manure is applied once in three years to the bájri crop.

49. The results obtained in the year under report are tabulated below. The bájri yields are unreliable as the crop was damaged at flowering time by heavy rains which washed off the pollen thus preventing much of the grain from setting. Kodra and sundhia have yielded better on the deep ploughed plots while deep ploughing has not benefitted tur :—

Shallow cultivation.						Deep cultivation.					
No. of plot.	Crop.	Yield per acre in lbs.		Value of produce per acre in rupees.	Cost of cultivation per acre in rupees.	No. of plot.	Crop.	Yield per acre in lbs.		Value of produce per acre in rupees.	Cost of cultivation per acre in rupees.
		Grain.	Fodder.					Grain.	Fodder.		
11	Bájri ... Tur ... Math ...	480 300 224	2,408 460 1,684	49 4 8	42 11 8	22	Bájri ... Tur ... Math ...	376 228 204	1,792 320 1,228	39 5 8	43 11 8
9	Kodra ... Tal ... Tur ... Sherla ...	504 ... 404 120	943 ... 524 38 (Fibre).	32 15 0	19 2 8	20	Kodra ... Tal ... Tur ... Sheria ...	616 ... 328 184	1,183 ... 484 52 (Fibre).	36 3 4	20 2 8
10	Sundhia ...	384	2,792	30 9 8	19 4 0	21	Sundhia ...	436	3,208	35 0 0	20 4 0

Cultural Experiment No. 2.

50. In this experiment the influence of deep ploughing upon the cotton-wheat rotation is under investigation. The deep ploughing is done by means of Ransomes CT2 plough. The variety of local cotton is Lalio which is grown as an irrigated crop in certain parts of the Ahmedabad District. Each plot is ¼th of an acre in area. The cotton is manured every alternate year with farm yard manure at the rate of 20,000 lbs. per acre while the wheat receives a dressing of castor cake at the rate of 800 lbs. per acre. Both crops are irrigated.

51. The results for cotton obtained in the year under report are tabulated below from which it will be seen that the yields on both plots were good but the deep ploughed plot gave a higher outturn by about 10 per cent. than the shallow ploughed plot. The results for wheat are not reported because the crop was severely damaged by white ants :—

Shallow Ploughing.					Deep Ploughing.				
No. of plot.	Crop.	Yield per acre in lbs. of seed cotton.	Value of produce in rupees per acre.	Value of production in rupees per acre.	No. of plot.	Crop.	Yield per acre in lbs. of seed cotton.	Value of produce per acre in rupees.	Cost of production in rupees per acre.
			Rs. a. p.	Rs. a. p				Rs. a. p.	Rs. a. p.
51	Lalio cotton ..	1,044	116 0 0	86 11 0	59	Lalio cotton .	1,148	128 7 0	89 9 0

Cultural Experiment No. 3.

52. In this experiment the most profitable number of rice seedlings to transplant was under investigation. In local practice two seedlings are usually transplanted. Accordingly transplantation with bunches containing one, two and three seedlings were compared. The season was not a very good one for rice and the yields on none of the plots were high but there was a gradual marked increase according to the higher number of seedings included in each bunch at transplantation time. The whole area was manured at the rate of 20,000 lbs. of farm yard manure. The results are tabulated below :—

No. of plot.	Crop.	No. of Seedlings.	Yield per acre in lbs.		Value of produce in rupees per acre.
			Grain.	Fodder.	
			Lbs.	Lbs.	Rs. a. p.
93A	Sutar Sal	1	1,362	1,554	39 2 3
93B	Do.	2	1,991	2,233	56 15 11
93C	Do.	3	2,005	2,538	58 7 1

SECTION IV—ROTATIONAL EXPERIMENTS.

Rotation Experiment No. 1.

53. The system of growing mixed crops is very much in vogue in Northern Gujarát. An experiment to ascertain the relative advantages of this system over single cropping was again conducted in the year under report when pure crops of kodra, bajri, bavto, etc., were compared with their common mixtures. The results of such an investigation can only be accepted after a series of years because one advantage of mixed cropping lies in the security it gives against serious damage to any one crop in a particular year.

54. The results obtained in the year under report are tabulated below from which it will be seen that kodra mixture has left a much greater profit than a single crop of kodra. Bájri mixture has also done better than a single crop of bájri while the crops making up bávto mixture have left a little more profit when grown singly than when grown in mixture, although the yields of the several crops have differed considerably.

In the mixed crop bávto did well and apparently smothered the castors and wál while in the other case bávto did not do nearly so well but both castors and wál did much better:—

Single Crops.							Mixed Crops.					
Groups.	No. of plot.	Crop.	Yield per acre in lbs.		Value of produce per acre in rupees.	Cost of production per acre in rupees.	No. of plot.	Crop.	Yield per acre in lbs.		Value of produce per acre in rupees.	Cost of production per acre in rupees.
			Principal product.	By-product.					Principal product.	By-product.		
			Lbs.	Lbs.	Rs. a. p.	Rs. a. p.			Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
I	44	Kodra ...	796	1,316	19 7 0	13 9 0	33	Kodra ... Tal ... Tur ... Sheria ...	685 6 512 172	1,280 ... 648 56 (fibre).	44 8 8	19 6 0
II	43	Bájri ...	438	3,293	29 12 8	29 15 0	32	Bájri ... Math ... Mug ... Tur ...	300 100 132 104	2,000 210 928 175	36 10 4	31 6 4
III	42	Bávto* ... Castors ... Wál ...	528 284 48	744 ... 688 (Green pods).	19 3 0	29 3 0	31	Bávto ... Castors ... Wál ...	1,052 23 16	2,684 ... 258 (green pods.	49 10 0	29 9 4

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* The yield of each crop on plot 42 is calculated for ⅓rd of an acre as it was equally divided between bávto, castors and wál.

Rotational Experiment No. 2.

55. In this experiment bájri and kodra mixtures grown continuously are compared with the same mixtures grown as a two year rotation. The results of such an investigation will not be definite until the work has been continued over a series of years. The results obtained in the year under report are tabulated below :—

Group of plots.	Rotation.	No. of plots.	Crop.	Yield per acre.		Value of produce per acre.	Cost of production per acre.
				Principal product.	By-product.		
				Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
I	Continuous Bájri mixture.	137	Bájri	408	2,360	40 2 0	28 2 8
			Mug	192	928		
			Math	40	360		
			Tur	108	168		
II	Bájri mixture and Kodra mixture in rotation.	138	Kodra	608	1,200	44 2 8	21 5 4
			Tal	10	...		
			Tur	528	768		
			Sheria	164	64		
		139	Bájri	416	2,768	38 3 4	27 13 4
			Mug	168	880		
			Math	12	176		
			Tur	72	144		
III	Continuous Kodra mixture.	140	Kodra	680	1,096	33 0 0	21 3 4
			Tal	...	...		
			Tur	328	408		
			Sheria	136	88		

SECTION V—MISCELLANEOUS WORK.

Ensilage.

56. This is made annually as it provides a good cheap succulent food for the plough cattle in the hot weather when the price of fooder is high. In the year under report 38,243 lbs. of green grass were filled into the silo about the middle of September. The silo was opened on the 12th of March and the silage lasted until the 9th August. The cause for the silage lasting so long was due to an outbreak of foot and mouth disease which prevented the cattle for a period consuming as much as they, otherwise would have done and this delay naturally had the effect of increasing the percentage wastage. Altogether 22,766 lbs. of edible silage was obtained. The cost of production worked out at 218 lbs. per rupee. When this silage came into use ordinary sundhia jowár was selling at 60 lbs. per rupee. The cattle kept in

good condition while this silage was fed to them once a day at the rate of 20 lbs. per head per day.

Control plots.

57. According to Government Resolution No. 8241, dated 20th August 1907, four plots were set aside to compare the yields of bájri and kodra mixtures when treated according to the ordinary local methods with those when the land has been well manured. In the season under report the residual effects of 15,000 lbs. of farm yard manure were under observation as the manure is applied only once in two years. The results obtained with bájri were as follows :—

No. of plot.	Treatment.	Yield per acre in lbs.		Value of produce per acre in rupees.	Cost of production in rupees per acre.
		Grain.	Stalks.		
		Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
124A	No manure	607	3,409	34 15 6	19 1 8
124B	Residue of 15,000 lbs. of Farm yard manure	632	3,768	35 10 8	19 1 8

but the yields on both plots were much below normal, being only 7½ to 8 annas, owing to the rain falling at the time of flowering and thus washing off the pollen and preventing the grain from setting.

58. The results obtained with kodra mixture were as follows :—

No. of plot.	Treatment.	Crops.	Yield per acre in lbs.		Value of produce in rupees per acre.	Cost of production in rupees per acre.
			Grain.	Stalks.		
			Lbs.	Lbs.	Rs. a p.	Rs. a. p.
123A	No manure ...	Kodra ...	603	1,292	60 7 9	23 14 0
		Tal ...	110	...		
		Tur ...	804	992		
		Sheria ...	102	65 (fibre).		
123B	Residue of 15,000 lbs. of Farm yard manure.	Kodra ...	620	1,284	63 2 8	23 14 0
		Tal ...	116	...		
		Tur ...	912	1,070		
		Sheria ...	116	60 (fibre).		

On both plots kodra did poorly in the year under report and yielded only a five anna crops. Heavy rains spoiled the germination of til. Tur did well and yielded 13 and 15 anna crops respectively but sheria gave a poor outturn and many plants were attacked by wilt disease.

EXPERIMENTS AND DEMONSTRATIONS MADE OFF THE STATION.

59. To demonstrate the use of fertilizers a few experiments on rice and tobacco were arranged in cultivators' fields.

The following table gives the details of rice experiments :—

Serial No.	Area.	Crop.	Manure.			Value of manure per acre.	Irrigated or not.	Yield per acre in lbs.		Value of produce per acre in Rupees.	Net profit or loss per acre due to manure.
			Kind.	Quantity.				Grain.	Fodder.		
				Per plot.	Per acre.						
	A. g.			Lbs.	Lbs.	Rs. a. p.		Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
1	1 7	Rice ...	Ammonium sulphate.	53	45	8 10 8	Once ...	2,519	1,924	85 4 0	+6 4 10
			Potassium chloride.	35¼	30						
			Basic slag ...	55	50						
2	0 7	Do. ...	Nil ...	...	...	...	Do. ...	2,057	1,640	70 4 6	......

An addition of fertilizers worth Rs. 8-10-8 has resulted in a net profit of Rs. 6-4-10.

60. The following are the results of the tobacco experiments :—

No. of Experiment.	Serial No.	Area in gunthás.	Crop.	Manure.			Value of manure per acre.	Irrigated or not.	Yield per acre in lbs.	Value of produce per acre in rupees.	Net profit or loss due to manure.
				Kind.	Quantity in lbs.						
					Per plot.	Per acre.					
					Lbs.	Lbs.	Rs.		Lbs.	Rs a. p.	Rs. a. p.
I	1	20	Tobacco	Sodium Nitrate.	40	80	28	Irrigated.	3,454	486 14 0	+19 8 0
				Potassium sulphate.	96	192					
				Superphosphate.	52	104					
	2	20	Do. ...	Nil ...	...	...	...	Do. ...	3,118	439 6 0	......
II	3	12	Do. ...	Sodium Nitrate.	24	80	28	Do. ...	2,792	411 10 8	+47 13 4
				Potassium sulphate.	57½	192					
				Superphosphate.	31	104					
	4	24	Do. ...	Nil ...	...	...	...	Do. ...	2,792	335 13 4	......

The cultivator who tried the fertilizers in Experiment No. 1 gave his opinion as under :—

"It is true that the fertilizers are beneficial to the tobacco crop but I think that they must be added in larger quantity." The cultivator who tried the manure in Experiment No. 3 reported that the manures gave a good outturn and that the colour of the tobacco manured with fertilizers was superior.

The use of these fertilizers was specially demonstrated in the village of Virsad, where tobacco is highly cultivated and the price of farm yard manure is increasing.

60. To demonstrate the use of steeping seed in copper sulphate solution to prevent smut in bájri and jowár, also to show the turn-wrest plough working, small demonstrations were held in Mahudha, Virsad and Asodar.

The following is a list of appendices :—

Appendix **A.**—Water requirements of the crops.
Appendix **B.**—Analysis of manures used on the Farm.
Appendix **C.**—Analysis of the water of the Farm well used for irrigation purposes.
Appendix **D.**—Seed distribution.
Appendix **E.**—Distribution of implements.
Appendix **F.**—Distribution of manures.
Appendix **G.**—Visitors during the year.
Appendix **H.**—Statement of inquiries.
Appendix **I.**—Note on the Farm crops *versus* cultivators.
Appendix **J.**—Demonstration.

APPENDIX A.

Water requirements of the Crops.

The following table gives the details of the quantity of water taken by several crops per acre during the year 1909-10 :—

Crop.	Quantity of water at the time of sowing.	Quantity of water at 1st watering.	Quantity of water at 2nd watering	Total number of watering.	Total quantity of water supplied.		Rainfall during the period.	Total quantity of water in inches of rainfall.	Remarks.
					In gallons.	In inches of rainfall.			
	In gals.	In gals.	In gals.			Inches.	Inches.	Inches.	
Tobacco ...	Nil.	42,100	38,280	2	80,280	3·58	3·44	7·2	
Rice ...	Nil.	68,548	63,300	2	150,818	6·71	26·64	30·35	
Potatoes. ...	Nil.	36,784	23,000	8	219,284	9·34	0·8	9·42	
Wheat ...	33 76	41,824	26,420	6	239,220	16·67	Nil.	10·67	

APPENDIX B.

The following table gives the details of analysis of manures used on the Farm :—

Kind of manure.	Nitrogen.	Phosphoric acid.	Potash.	Remarks.
	Per cent.	Per cent.	Per cent.	
Farm yard manure ...	0·87	0·60	1·05	
Nitre*	4·12	...	10·56	22·66 per cent. Nitre.
Sodium Nitrate*	6·35	...	...	38·49 per cent. Sodium Nitrate.
Ammonium sulphate* ...	10·90	...	...	51·32 per cent. Ammonium sulphate.
Potassium sulphate ...	...	...	49·50	91·53 per cent. Potassium sulphate.
Castorcake	4·11	1·70	1·32	
Safflowercake	0·56	2·19	2·41	
Cotton-seed cake	4·26	2·53	1·25	

* These manures were mixed with soil for conservation.

APPENDIX C.

The following statement gives the details of analysis of water of the farm well used for irrigation purposes :—

	Parts per 100,000.
	Per cent.
Sodium Bicarbonate ...	4·34
Calcium Carbonate ...	11·00
Magnesium Carbonate ...	27·28
Sodium Carbonate ...	4·21
Magnesium Sulphate ...	Nil.
Sodium Sulphate ...	14·61
Magnesium Chloride ...	Nil.
Sodium Chloride ...	79·22
Sodium Nitrate ...	12·12

APPENDIX D.

Distribution of seed, 1909-10.

No.	Name of Seeds.	Quantity.	Number of persons to whom seed was distributed.		
			Cultivators.	Non-cultivators.	Other farms.
		Lbs.			
1	Bájri ...	260	11	...	3
2	Bájaro ...	2	...	...	2
3	Bulrush millet ...	29	2	1	3
4	Natal bájri ...	7	...	...	3
5	Awned bájri ...	¾	...	1	1
6	Sundia jowár ...	1,515	4	1	5
7	Chapti jowár ...	1	1	...	...
8	Kodra ...	6	...	...	2
9	Bavto ...	7	...	...	3
10	Cheno ...	6	...	...	2
11	Káng ...	6		...	2
12	Jirasal rice ...	1½	...	1	1
13	Pankhali rice ...	1½	...	1	1
14	Kamod rice ...	1½	...	1	1
15	Wheat dhola ...	10	...	...	1
16	Do. poptia ...	280	1	...	3
17	Tuer ...	600	1	...	6
18	Do. varieties ...	8¼	...	1	2
19	Mag ...	21	...	...	2

APPENDIX D—*continued.*

No.	Name of Seeds.	Quantity.	Number of persons to whom seed was distributed.		
			Cultivators.	Non-cultivators.	Other farms.
		Lbs.			
20	Math ...	404	1	...	4
21	Udid ...	261	...	...	4
22	Chola ...	481	...	...	5
23	Wál ...	107	1	1	1
24	Do. varieties ..	5	...	...	1
25	Guvar ...	163	1	...	1
26	Do. varieties ...	6	...	2	...
27	Gram ...	4	...	...	1
28	Sheria or ambadi ...	1	...	...	1
29	San or hemp ...	40	1	...	...
30	Tal .	2⅛	...	1	2
31	Safflower-seed ...	5	...	...	1
32	Castor-seed ...	7	1	...	2
33	Niger-seed ...	½	1	...	...
34	Black rape ...	5	...	...	1
35	Yellow rape ...	15	...	...	2
36	Cai Sen ...	1	...	...	1
37	Cai Trang ...	1	...	...	1
38	Tobacco ...	4 5/16	4	2	4
39	Do. varieties ...	½	...	1	2
40	Cotton bourbon ...	40⅛	13	2	3
41	Spence cotton ...	4	1	4	...
42	American Hybrid, No. 1367.	35¾	11	1	...
43	Abassi ...	2	2	...	...
44	Broach ...	5¼	...	...	4
45	Ropey ...	7¼	...	...	3
46	Wagad ...	5¼	...	...	4
47	Lalio ...	5¼	...	...	2
48	Potatoes ...	320	1	...	1
49	Bhinda ...	5½	1	1	...
50	Mula ...	52	...	2	...
51	Mogri ...	1	...	1	...
52	Onions ...	¼	...	...	1
53	Miscellaneous vegetable seed.	Small quantities	6	2	...
54	Maize ...	4	1	...	...

The seeds supplied from the farm are much appreciated by the cultivators which can be seen from the following letter received from a cultivator.

"I have much pleasure in stating that the tobacco seed supplied from the Nadiád Farm was very good and gave a high yield."

GOKULBHAI KASANDAS.

APPENDIX E.

The following statement shows the details of implements distributed during the year 1909-10 :—

Names of the implements.	Number of implements given to			Total.
	Cultivators.	Non-cultivators.	Other farms.	
Hand Chaff Cutter	4	...	...	4
C. T. 2 ploughs	2	1	1	4
B. T. 2 ploughs	4	...	1	5
Plough Shares	2	...	...	2
Kharpadis or weeding hooks ...	...	...	40	40
Local plough	...	...	1	1

APPENDIX F.

The following statement shows the details of manure distributed during the year 1909-10 :—

Names of the Manures.	Quantity given to			Total.
	Cultivators.	Non-cultivators.	Other farms.	
	Lbs.	Lbs.	Lbs.	Lbs.
Ammonium Sulphate ...	24	...	40	64
Potassium Sulphate ...	90	...	...	90
Sodium Nitrate	50	...	...	50
Superphosphate	95	...	...	95

APPENDIX G.

The station was visited by 569 persons. The following table shows the details of visitors who visited the station during the year 1909-10 :—

Dates.	Cultivators.	Non-cultivators	Officers.	Total.	Remarks.
From 1st April 1909 to 30th June 1909	97	21	...	118	
From 1st July 1909 to 30th September 1909 ...	86	5	4	95	
From 1st October 1909 to 31st December 1909 ...	120	47	9	176	
From 1st January 1910 to 31st March 1910 ...	128	44	8	180	
Total ...	431	117	21	569	

APPENDIX H.

Generally the cultivators on this side do not make written enquiries. However the following enquiries were made and all of them were answered by the Superintendent, Mr. D. H. Tagare :—

Serial No.	Subject of the enquiry.	Places from which enquiry was made.
1	Hand pump ...	Dhárwár, Gangad and Viramgám.
2	Chain pump ...	Kapadvanj, Cambay, Bamangam, Chhapra.
3	Hand-chaffcutters ...	Khárághoda, Vad gam (Mahi Kántha).
4	Winnower ...	Poona.
5	Oil Engine ...	Bombay, Dhulia, Bhuj and Uttersanda.
6	Water lifting wheels ...	Viramgám.
7	Lown mower ...	Nadiád, Dohad.
8	Iron plough ...	Ahmedabad, Paneli Noli, Sánand, Raopur, Adalaj, Jamatpur, Baroda, Viramgám and Rahimatpur.
9	Artificial manures ...	Rustampura.
10	Farming ...	Poona, Sholápur.
11	Tobacco cultivation ...	Bársi, Vadgam, Amaner.
12	Tapioca ...	Kirkee, Virsad, Bakrol.
13	Bavto ...	Surat.
14	Guvar ...	Dhárwár.
15	Pamphlets on agricultural subjects.	Mymensingh, Sakal, Jholana and Linch.
16	Rice and chillies ...	Navli.
17	Cultivation of groundnut, tea.	Virsad.
18	Cultivation of cardamoms .	Virsad.

APPENDIX I.

Note on the Farm Crops versus *Cultivators.*

Bájri.—Owing to heavy rain at the time of flowering the yield of bájri was below the average in the district. A good crop of a cultivator near the farm was 800 lbs. per acre while a good crop on the farm yielded at the rate of 1,536 lbs. per acre.

Jowár.—The season was much more favourable to jowár, but in their hurry the cultivators sowed any kind of seed and some of the varieties, being late, did not flower at all. A good yield on a cultivator's field was 600 lbs. grain per acre while the farm yield was at the rate of 1,712 lbs. grain per acre.

Kodra.—For the last 10 years the seasons have not been favourable to kodra as the late rains have nearly always been deficient. This season however was favourable. A good yield on a cultivator's field near the farm was at the rate of 1,800 lbs. while a good crop on the farm yielded at the rate of 2,000 lbs. of grain per acre.

Tobacco.—Tobacco was a very good crop this year and good crops of the cultivators were equal to those of the farm.

APPENDIX J.

Demonstration.

For the benefit of the cultivators of Kaira District a demonstration with a small exhibition was held on the Nadiád Farm on the 24th January. Cultivators from the following tálukas were invited to attend :—

Nadiád.
Mehamdabad.
Borsad.
Mátar.
Thásra.
Anand.
Kapadvanj.

Arrangments were made to receive the cultivators at the station. About 300 persons were present.

In the morning at the commencement the cultivators were shown the comparative working of the Turnwrest ploughs and the country plough.

During the recess arrangements were made to provide dinner to all the cultivators.

In the afternoon the cultivators were taken to a shed where a small exhibition of agricultural products was arranged for them. Afterward a meeting to discuss agricultural questions was arranged and the Mámlatdár of Nadiád took the chair. Information were asked for on several questions, which was furnished by the Superintendent. Cultivators were then requested to give their own experiences regarding ploughs, seed, manure, etc.

Mr. Bholanath of Asodar spoke in detail upon the advantages he obtained by using the Turnwrest plough.

Mr. Nathabhai of Dabhan spoke on special manure for rice and tobacco and asked the cultivators to use fertilizers as the Farm Yard Manure was growing dearer and dearer.

Mr. Kashibhai Lalubhai of Virsad spoke very highly of the boring apparatus. He advised the cultivators to breed cattle themselves for the farm use. He condemned the present practice of leaving their important branch of agriculture in the hands of the Rabaries.

The Mámlatdár of Nadiád advised the cultivators in a lengthy speach and told them that the Patidars now-a-days do not pay much attention to agriculture. He brought to the notice of the cultivators important exhibits, implements, and standing crops on the farm.

At the conclusion Mr. Tagare thanked all the cultivators for the trouble they had taken and requested them to be benefitted by what they saw and heard during the course of the day.

Thanks are due to Mr. Kashibhai, the Mámlatdár of Nadiád, who took a great interest in the Demonstration.

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Department of Agriculture, Bombay.

ANNUAL REPORT

ON THE

EXPERIMENTAL WORK

OF THE

NADIAD AGRICULTURAL STATION

(Kaira District, Gujarát)

FOR THE YEAR

1910-1911

BY

T. FORSTER MAIN, B.Sc., ETC.,
Deputy Director of Agriculture, Bombay Presidency, Poona.

BOMBAY
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1911

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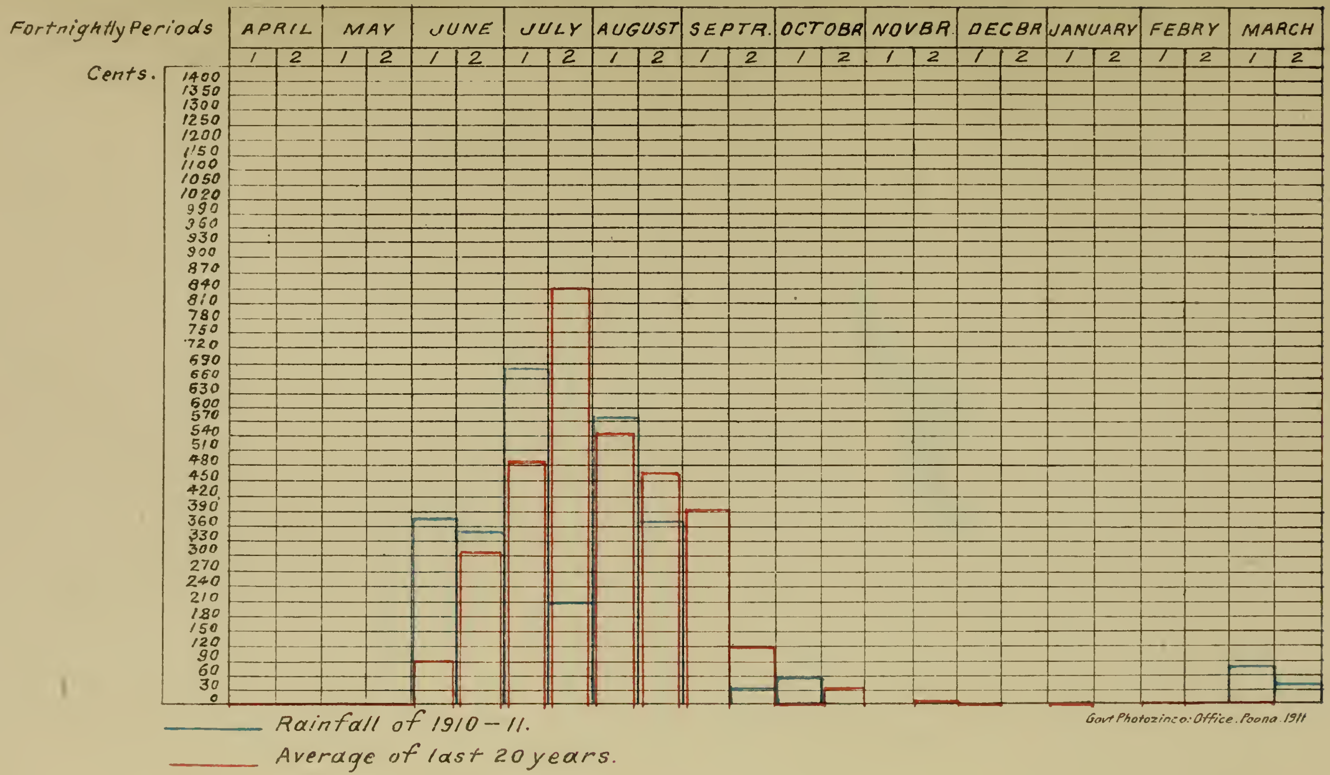
1910 – 11.

NADIAD AGRICULTURAL STATION



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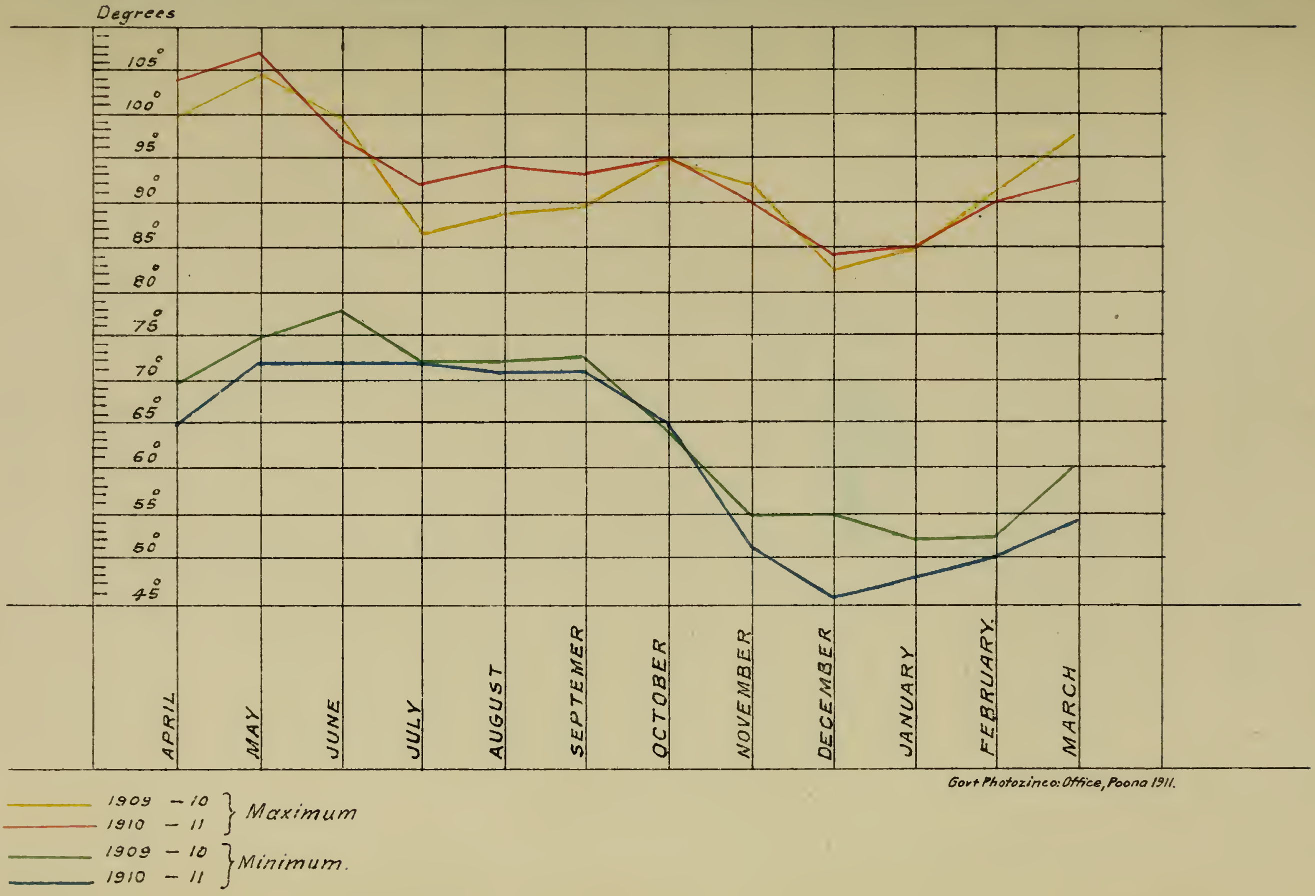

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THE NADIAD AGRICULTURAL STATION, 1910-1911.

1. *Established* in 1903; *North Latitude* 22°; *East Longitude* 73°; *Elevation*—Approximately sea level; *Soil*—Alluvial loam (var. Goradu); *Average rainfall*—32 inches 95 cents; *Temperature*—Maximum 110 in May, minimum 35 in January.

Area.—44 acres.

Superintendent.—Mr. Dattatraya Hari Tagare. In addition to his farm duties Mr. Tagare organized and conducted demonstrations at Ashápuri, Dákor, Vávtha, Ahmedabad and gave an extensive ploughing demonstration at Virsad. The Superintendent also supervised manurial experiments on cultivators' crops of tobacco, cotton, chillies and rice.

2. *Season.*—The monsoon set in very early, the first shower of rain falling on the 4th June. By the 7th of that month there had been sufficient rain to permit of the commencement of sowing operations. This early rain took many of the cultivators by surprise. Much manure still remained in the villages as there was no time to put it on the land. Altogether 7 inches and 20 cents of rain fell in the month of June. There were heavy rains also in July amounting to 8·93 inches, of which 3·10 fell on the 6th of that month. August was a wet month, there being 22 rainy days and a total fall of 9·45 inches. There was very little rain in September and only about half an inch in October. The total effective rainfall was about 7 inches below normal. At the end of January there was serious frost, and much damage was done to cotton and tobacco and other standing crops. The effect of the season upon particular crops will be referred to in the appropriate places.

3. For convenience the work of the station will be referred to under the following sections:—

Section I.—Crop Experiments,

Section II.—Manurial Experiments,

Section III.—Cultural Experiments,

Section IV.—Rotation Experiments,

while several appendices are added.

Tobacco.

4. It was pointed out in paragraph 5 of last year's report that experiments with the finer types of tobacco varieties intended for cigar wrapper purposes would be discontinued and attention confined to American and Turkish Tobaccos suitable for cigarette purposes. This has been done and seed of the following varieties was secured : —

American tobaccos.

1. Hestor.
2. Conqueror.
3. Yellow Prior.
4. Yellow Mammoth.
5. Kentucky Yellow.
6. White stemmed Oronoco.

Turkish tobaccos.

1. Ayasolouk.
2. Cavalla.

All the varieties grew healthily and appeared to be agriculturally suited to the conditions of Nadiád. The American varieties were subsequently barn-cured, while the Turkish were sun-cured as suggested by the Imperial Institute, London. Samples of the cured leaf, together with a sample of local Nadiád tobacco, were forwarded to the Peninsular Tobacco Company at Monghyr, E. I. R. (India), for favour of opinion, but that firm did not approve of the colour of the American samples and reported that the colour was much too dark for any desirable cigarette purposes. The flavour and texture of the leaf were also considered to be unsatisfactory. In the case of the Turkish samples the texture was reported to be a little coarse, but the Ayasolouk variety was reported to be best from the point of view of texture, flavour and colour. It will thus be seen that we have reached a point when little further can be done in the way of introducing a superior grade of tobacco into Northern Guzerát until the services of an expert tobacco curer have been obtained.

5. It was pointed out in paragraph 7 of last year's report that the great defect in Nadiád grown tobacco was its poor burning quality due to the very low percentage of potash in the leaf. Accordingly an experiment was commenced in the year under report in which a varying amount of potash both alone and in conjunction with other artificial manures was applied to a series of plots. There were two sub-series of plots, in one of which the potash was applied in the form of sulphate of potash and to the other wood ashes were applied, the quantities being fixed so as to supply definite amounts of K_2O.

6. The following diagram illustrates the general scheme of the experiment :—

	Duplicates.	Originals.	
100 lbs. of K_2O per acre per annum.	Plot 53. Sulphate	Plot 45. of Potash.	100 lbs. of K_2O per acre per annum.
	Wood	ashes.	
Nil ...	Plot 54. No (Potash)	Plot 46. manure.	*Nil.*
	No (Potash)	manure.	
50 lbs. of K_2O per acre per annum.	Plot 55. Sulphate	Plot 47. of Potash.	50 lbs. of K_2O per acre per annum.
	Wood	ashes.	

The whole of the area was manured at the rate of 20,000 lbs. farm yard manure per acre. In future years these series will be divided into three sub-divisions at right angles to the present divisions and the following additional treatments will be given :—

A.—300 lbs. of Superphosphate per acre.

B.—*Nil.*

C.—300 lbs. Superphosphate per acre.
+
200 lbs. of Sodium nitrate per acre.

Samples of the cured leaf have been forwarded to the Agricultural Chemist for favour of ascertaining the potash content but the results do not indicate any appreciable influence of these manures upon the Potash content of the leaf in this the first year of the Experiment.

Cotton.

7. Experiments have been conducted for several years to ascertain whether cotton cultivation on the light soils of Northern Guzerát can be made a profitable undertaking The results hitherto obtained point to the fact that high class cotton can be grown in this tract in a normal season wherever slight irrigation facilities exist. There are however two main limiting factors assuming the monsoon to be normal, (1) the necessity for irrigation in May, and (2) the liability of frost after the new year. Even where irrigation does not exist it has been found that good

quality cotton can be grown in an average season as will be seen in some of the following paragraphs which deal with Buri and Cambodia cottons.

8. Experiments with Bourbon cotton as a perennial crop were continued in the year under report. This crop was sown in May 1909 with the aid of irrigation. Two irrigations were required previous to the monsoon (1909) setting in. But the crop was never subsequently irrigated. The plants were lightly pruned in the beginning of June 1910. In this, their second season, the plants grew very luxuriantly and bore a great number of bolls, and although some slight damage was caused by frost before the last picking at the end of January the following outturns were obtained:—

Name of variety.	Yield per acre of seed cotton in lbs.	Remarks.
Bourbon 23T ...	1,392	Growth very vigorous, plants 6 feet high.
Bourbon 10T ...	1,092	Do. do.

9. The seed cotton was ginned on the Farm. The lint was sold to the Industrial Mills of Broach for Rs. 343 per kandy of 784 lbs.,* which was probably below its value as there is no organized market for this class of cotton, and a sample of 10T which was sent to the Bombay Chamber of Commerce† was valued at Rs. 380 per kandy of 784 lbs., while valuations obtained by the Imperial Cotton Specialist‡ showed this cotton to be worth Rs. 370 per kandy. The Chamber of Commerce reported "Fully good to fine class but staple long and silky," while the other valuers reported it to have the style of Hinganghát with the staple of Surat. The reports upon the spinning value of this (10T) cotton were somewhat conflicting. The Bombay Mill Owners' Association to whom a hand sample was sent reported it to be suitable for spinning 24^s warp and 30^s weft, while the Broach Industrial Mills, to whom nearly 300 lbs. of this cotton was sold, reported that the staple was good and the colour very good and that it could spin up to 50^s very well. Similarly 23T was reported to be fit for spinning up to 40^s to 50^s.

---

* This was done on the 8th April when Local Surat Cotton was selling at Rs. 320.

† Standard Fine machine ginned Navsári at Rs. 380.

‡ Do. do. Rs. 400.

The following statements summarize the profit and loss account connected with the cultivation of this cotton, from which it will be seen that the considerable profit comes chiefly from the second year's crop:—

STATEMENT No. 1.

Statement showing the yield and cost of cultivation of Bourbon cotton (10T) for the years 1909-10 and 1910-11 (plot 82).

Value of produce in Rs. per acre.

Yield per acre.	Lbs.	Rs.	a.	p.	Rs.	a.	p.
1909-10—	Lbs.	Rs.	a.	p.			
Seed cotton 116 lbs.—							
Lint	29	12	11	0			
Cotton seed	87	2	11	6			
					15	6	6
Bhinda					12	7	2
Total					27	13	8
1910-11—	Lbs.						
Seed cotton 1,092 lbs.—							
Lint	273				119	7	0
Cotton seed	819				25	9	6
Total					145	0	6

Cost of cultivation in Rs. per acre.

	Rs.	a.	p.
1909-10—			
Preparatory tillage	3	7	0
Cost of seed	0	6	0
Manure	*Nil.*		
Sowing, etc.	4	7	8
Weeding	13	8	2
Irrigating	8	6	0
Picking	8	5	6
Total	38	8	4
1910-11—			
Prunning	1	4	0
Weeding	9	8	0
Picking	25	1	0
Total	35	13	0

STATEMENT No. 2.

Statement showing the yield and cost of cultivation of Bourbon cotton (23T) for the year 1909-10 and 1910-11 (plot 81).

Value of produce in Rs. per acre.

Yield per acre.	Lbs.	Rs.	a.	p.	Rs.	a.	p.
1909-10—	Lbs.	Rs.	a.	p.			
Seed cotton 408 lbs.—							
Lint	97	42	7	0			
Cotton seed	311	9	11	6			
					52	2	6
Bhinda					12	7	2
Total					64	9	8
1910-11—	Lbs.						
Seed cotton 1,392 lbs.—							
Lint	332				145	4	0
Seed	1,060				33	2	0
Total					178	6	0

Cost of cultivation in Rs. per acre.

	Rs.	a.	p.
1909-10—			
Preparatory tillage	3	7	0
Cost of seed	0	6	0
Manure	*Nil.*		
Sowing, etc.	4	7	8
Weeding	13	8	2
Irrigating	8	6	0
Picking	8	5	6
Total	38	8	4
1910-11—			
Prunning	1	4	0
Weeding	9	8	0
Picking	25	1	0
Total	35	13	0

Note.—For the purpose of this calculation the cotton is valued at 7d. per lb. but in May 1911 it was valued in Bombay at 8d.

10. Experiments were continued with the two hybrid cottons, *viz.* 1367 and 1368, which had given some promise in previous seasons. These are crosses between Texas and Bourbon cottons. These hybrids were sown at two times (*a*) in May with the aid of irrigation, and (*b*) in July after the monsoon had set in. The results with the July sown crop were fairly definite in that the cotton was destroyed by frost at the end of January when it had yielded less than 50 lbs. of seed-cotton and hence it would seem that the risk from frost in January or February prohibits the cultivation of these hybrids as a monsoon sown crop. The May sown crop came into bearing earlier and although damaged by frost yielded fairly well in the case of 1367, but only moderately in that of 1368. It is of further interest to note that one plot which was also irrigated after the monsoon in October and December did not benefit from these irrigations probably because it delayed fruiting until it was caught by the frost. The results obtained in the season under report are tabulated below :—

Number of hybrid.	Description of hybrid.	When sown.	When irrigated.	Ginning percentage.	Yield per acre in lbs. of seed cotton.
				Per cent.	
1367	Texas × Bourbon (13T)	May	May 30th October 24th December 10th	26	508
Do.	Do.	May	May 30th	25·6	536
Do.	Do.	July	October 24th December 10th.	25·5	40
Do.	Do.	July	Nil	25·6	39
1368	Texas × Bourbon (15T)	May	May 30th	25·7	302
Do.	Do.	July	Nil	26·1	48

Samples of these hybrids were valued by two separate bodies whose valuations are summarized below :—

Register No. of hybrid.	Valuations in rupees per khandy of 784 lbs. of cotton.	
	*The Bombay Chamber of Commerce.	† Through the Imperial Cotton Specialist.
1367	Rs. 395 very long silky staple, but class off fine.	Rs. 400 ; Egyptian style of cotton, long staple and reddish colour.
1368	Rs. 390 do.	Rs. 390, same as above, but slightly inferior in staple.

Standards of valuation. { * Fine machine ginned Navsári Rs. 380 per khandy.
† Do. do. 400. do.

Another hybrid, *viz.* 1379 (Abassi × Bourbon 20T), turned out to be very late in maturing even though sown in May and was consequently destroyed by frost. The bolls, moreover, did not open well and hence it has been rejected.

11. Buri and Cambodia cottons were similarly tested to the hybrids mentioned above and gave very promising results. These cottons require a shorter period to come to maturity which gives them a great advantage over the cottons mentioned in the preceding paragraphs, as they suffered no damage from frost being previously picked. The results obtained in the season under report are tabulated below :—

Name of cotton.	Date of sowing.	Date of irrigating.	Ginning percentage.	Yield of seed cotton in lbs. per acre.
			Per cent.	
Buri	May ...	May 30th	31·9	1,024
Do.	July ...	Nil	29·4	688
Cambodia	May ...	May 30th	32·3	688
Do.	July ...	Nil	32·2	440

12. The following statements summarize the financial results of the experiment :—

STATEMENT I.

Showing the yield, value and cost of cultivation of Buri cotton sown in May and July for the year 1910-11.

Yield per acre in lbs.	Value per acre in Rs.			Cost of cultivation per acre in Rs.			
	Rs.	a.	p.		Rs.	a.	p.
Sown in May—				May sown—			
Seed-cotton 1,024 lbs. at Rs. 135 per bhár of 924 lbs.	149	9	9	Previous tillage	1	11	0
				Seed	0	12	0
				Sowing, &c.	10	11	0
				Irrigation	4	13	4
				Weeding, hoeing, &c. ...	9	2	8
				Picking	6	10	4
				Total ...	33	12	4
Sown in July—				July sown—			
Seed cotton 688 lbs. at Rs. 135 per bhár.	100	8	3	Previous tillage	1	11	0
				Seed	0	12	0
				Sowing, &c.	5	4	0
				Weeding, hoeing, &c. ...	8	14	0
				Picking	6	10	4
				Total ...	23	3	4

STATEMENT II.

Showing the Yield, Value and Cost of Cultivation of Cambodia Cotton sown in May and July for the year 1910-11.

Yield per acre in lbs.	Value per acre in Rs.			Cost of cultivation per acre in Rs.			
	Rs.	a.	p.		Rs.	a.	p.
Sown in May—				May sown—			
Seed-cotton 688 lbs. at Rs. 135 per bhár of 924 lbs.	100	8	3	Previous tillage	1	11	0
				Seed	0	12	0
				Sowing, &c.	10	11	0
				Irrigation	4	13	4
				Weeding, hoeing, &c.	9	2	8
				Picking	6	10	4
				Total	33	12	4
Sown in July—				July sown—			
Seed-cotton 440 lbs. at Rs. 135 per bhár of 924 lbs.	64	4	6	Previous tillage	1	11	0
				Seed	0	12	0
				Sowing, &c.	5	4	0
				Weeding, hoeing, &c.	8	14	0
				Picking	6	10	4
				Total	23	3	4

13. We may therefore conclude that in a good season both Buri and Cambodia cottons can be grown at Nadiád as monsoon crops without irrigation provided that there is no frost till at least the end of January, but that where irrigation facilities exist in May these cottons should be established then so as to enable them to take full advantage of the whole of the monsoon rains. It will be noticed that the May sown plots have yielded 1½ times as much as the July sown plots.

The ginning advantage of these cottons over tree cottons will also be observed.

14. These cottons were sent to three separate bodies for valuation and their opinions are summarized below but it will be seen that there is some variance in their figures.

Name of Cotton.	Valuations in rupees per khandy of 784 lbs.		
	*Bombay Chamber of Commerce.	* Bombay Millowner's Association.	* Through the Imperial Cotton Specialist.
Cambodia	Rs. 370; off fine in class but good staple	Suitable for spinning 24s warp and 30s weft worth Rs. 365.	Rs. 350; creamy in colour and slightly rougher than Broach but may be classed as fine Broach good.
Buri	Rs. 367, do.	......	Rs. 335, Higanghát style of cotton, equal to fine Hinganghát good.

---

* Fine machine ginned Broach at Rs. 360 per khandy of 784 lbs. was the standard taken by all valuers.

Selection.

15. In paragraph 16 of last year's report it was pointed out that a few special plants had been selected in hybrids 1367 and 1368. These were sown separately in the year under report and the selected off-spring of each were picked collectively.

In the year under report a number of superior plants in these crosses were again found and these were separately harvested. The selection is summarized in the following statement :—

Register No. of cross.	Plant No. selected in 1909-10.	Remarks.	Weight in tolas of kapas.
1367 ...	I	Selected plants picked collectively for quality of fibre in 1910-11.	17½
1368* ...	I		15
1379 ...	I		20¼
	1910-11.		
1367 ...	1	Individually harvested and selected for quality of fibre.	1¼
	2		1½
	3		¾
	4		1
	5		½
	6		1¾
1379 ...	1	Selected for earliness and individually harvested.	3½
	2		1¼
	3		2
	4		1

* The other three plants producing inferior offspring were rejected.

16. In addition to the above special selections a collective selection as tabulated below was made in each of the cottons mentioned in the foregoing paragraphs to provide good seed for next season. The objects of this selection were—

(*a*) for earliness, and

(*b*) for prolificness.

The plants of each variety were picked collectively.

Serial No.	Name.	Selected for
1	10 T.	Earliness.
	"	Prolificness.
2	23 T.	Earliness.
	"	Prolificness.
3	Unirrigated Cambodia	Earliness.
	"	Prolificness.
4	Irrigated Cambodia	Prolificness.
5	Unirrigated Buri	Earliness.
	" "	Prolificness.
6	Buri irrigated	Prolificness.
7	1367 irrigated	Early.
	"	Prolificness.
8	1367 unirrigated	Earliness.
9	1368 irrigated	Earliness.
	" "	Prolificness.
10	1368 unirrigated	Earliness.

17. *Hybridization.*—The new crosses made in 1909-10 which were mentioned in paragraph 17 of last year's report, were carefully selected in the year under report, the progeny of each plant being harvested separately. The results obtained in the year under report are tabulated below. The fibre in this the first (F-1) generation was very good in most of the plants, being almost equal to Egyptian.

Statement of F-1 generation of crosses made in 1909-10.

Serial No.	Name of the cross.	Boll number, 1909-10.	Plants selected, 1910-11.	Remarks.
1	Abassi × Texas Bur	1	1, 1A	Fibre soft and long like Abassi and a little better in ginning though not equal to Texas in ginning percentage.
		4	2, 3	
		5	4, 5, 6, 7	
		6	8	
		7	9, 10	
		8	11, 12	
		9	13	
		10	14	
		11	14A	
		12	15, 16, 17	
2	Abassi × King's Improved.	1	1	The same remarks as Abassi × Texas, but fibre a little shorter.
		2	1A	
		3	2	
		4	3	
		5	4, 5	
		6	5A	
		7	6, 7, 5B, 5C, 7A, 7B	
		10	8, 9, 10, 11, 11A, 11B,	
		12	12, 13	

Serial No.	Name of the cross.	Boll number, 1909-10.	Plants selected, 1910-11.	Remarks.
3	Texas Bur × Abassi ...	1	1, 2	Fibre like Abassi in length and feel. Ginning better than Abassi though less than Texas.
		2	3, 4, 5, 6	
		3	7	
		4	8	
		5	9, 10, 11, 12,	
		6	13, 14	
		7	15, 16, 17	
4	King's Improved × Abassi.	1	1, 1A	Fibre the same as Texas × Abassi but a little shorter.
		2	2, 2A, 3	
		3	4	
		4	5	
		9	6, 7, 8, 9	
		11	10, 11	

18. Again in the season under report a number of new crosses* have been made. The numbers of successful bolls is tabulated below. The object of these crosses is to obtain a cotton of high ginning quality suitable for the conditions of Northern Gujarát :—

Serial Number.	Name of male parent.	Name of female parent.	No. of successful bolls obtained.
1	Abassi	Texas	19
2	Texas	Abassi	14
3	Abassi	King's Improved ...	5
4	King's Improved ...	Abassi	7
5	Abassi	10 T	30
6	10 T	Abassi	7
7	Abassi	23 T	26
8	23 T	Abassi	5
9	Abassi	Cambodia	29
10	Cambodia	Abassi	8
11	Do.	Cambodia	9

Bájri.

19. Comparative trials between local bájri and a few improved varieties were continued in the year under report. The results obtained are tabulated below and indicate that the local variety can hold its own with introduced varieties. The crops were not affected by injurious rains :—

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* The parents of these new crosses have been grown on the Nadiád farm for some years.

Name of the variety.	Yield per acre in lbs.		Value of produce per acre in rupees.			Cost of cultivation per acre in rupees.		
	Grain.	Stalks.	Rs.	a.	p.	Rs.	a.	p.
Bájri	1,088	4,512	58	14	4	22	6	4
Bájro	820	3,064	43	8	8	22	6	4
Bulrush	972	4,512	53	12	8	22	6	4
Natal	848	3,620	46	2	0	22	6	4

20. In 1908-09 some crosses between the three varieties, bulrush millet, awned bájri and local bájri, were obtained. Selection has been carried out on these crosses in 1909-10 and in the year under report with the result that 21 ear-heads possessing the characters of being large in size and bearing large grains together with awns, have now been selected; each of these will be sown separately and the behaviour of the offspring observed.

21. In the season under report selection was made in the three varieties, bulrush millet, bájro and local bájri, in three ways and the following selections have been secured:—

Name of variety.	Number of selections made.		
	Large grain.	Smut resistance.	Tillering habit.
Bulrush millet ...	30	15	13
Bájro ...	23	19	22
Bájri ...	19	16	20

Although selection for tillering has been made, it is doubtful whether this character is an advantageous one owing to the difference in the date of maturity of main and side stems, but this point will be observed.

Wheat.

22. This crop did not do so well as it at one time promised owing to the damage sustained from the severe frost at the end of January when the crop was in flower. Most of the varieties tested for yield last year were again compared in the season under report and the same three varieties which were first last year stood first again this year though not in the same order. These are

Tamra, Red Khadir, and Daudkhani of Delhi. The yields obtained are tabulated below. It should be noted that Shet Parner and Wagia were severely attacked by rust :—

Name of variety.	Yield per acre in lbs.	
	Grain.	Fodder.
Shet Parner	272	1,492
Amritsar Safed	924	3,408
Lalkasarwali	640	4,676
Daudkhani of Delhi	1,036	3,016
Red Khadir	1,152	3,228
Tamra	1,152	3,008
Red Deshi of Oudh	904	3,820
Australian Hybrid	536	2,520
Paman of Sirsia	960	3,824
Waltaar	200	2,952
Nagpur hybrid	604	3,376
Muzffarnagar		
Wagia	640	3,232

23. Two varieties were sent to Messrs. Ralli Brothers of Bombay for favour of valuation who reported as under:—Tamra—Hard yellow, underfed, Rs. 4-12-0 per cwt.; Safed of Amritsar—White glossy, underfed, Rs. 4-13-6 per cwt.

These valuations were made on the 25th of May 1911 and for the sake of comparison it may be mentioned that a very fine sample of hard yellow Shet Parner wheat from Dhulia was valued at Rs. 5-7-0 per cwt., while a well fed sample of soft white Pissi wheat from Dohad was priced at Rs. 4-15-0 per cwt.

24. *Selection.*—It was pointed out in paragraph 20 of last year's report that selection in wheat had been commenced. This work was continued in the year under report. The three objects aimed at are—

(*a*) to improve the ear-head by selecting those spikes which bear a large number of spikelets;

(*b*) to similarly improve the tillering capacity;

(*c*) to raise up rust resistant strains.

The selections made in the year under report are summarized in the following statement:—

Name of variety.	Selection for highest number of spikelets per spike.				Selection for largest number of tillers per plant.				Selection of rust free plants.
	Selection made in 1909-10.		Selection made in 1910-11.		Selection made in 1909-10.		Selection made in 1910-11.		
	Number of spikelets per spike.	Number of plants selected.	Number of spikelets per spike.	Number of heads selected.	Number of tillers per plant.	Number of plants selected.	Number of tillers per plant.	Number of plants selected.	Number of plants selected in 1910-11.
Shet Parner	21	Selected collectively.	18	31	14	Selected collectively.	23	1	24
Tamra	23		16 17	15 7	12		30	5	12
Dhola Katha	9		12	5	18		15	2	4
Popatia (Khapli)	21		21 26	31 1	11		20	2	...
Daudkhani of Delhi	...		21 22 23	21 13 5	...		28	3	...
Red Deshi of Oudh	...		22 23 24 25	23 1 4 3	...		26	2	...
Nagpur Hybrid × Muzaffarnagar	...		20 21 22	32 18 8	...		29	1	...

It should be pointed out here that the growth of the offspring of last year's selected plants was not good owing to bad germination and the crop suffered much from frost. It was observed that Dhola katha was much more severely attacked by rust than Shet Parner or Tamra.

All the plants mentioned in columns 5, 9 and 10 above will be sown each separately in 1911-12 for further observation and selection.

25. *Hybridization.*—One of the chief obstacles to wheat cultivation on the irrigated lands in the Kaira District is the liability of severe outbreaks of rust. For this reason the inferior local variety, *viz.* Popatia (Khapli) wheat, is almost exclusively grown on these lands. In order to ascertain whether a superior rust resistant wheat could be evolved by crossing this local variety with other good varieties, a number of crosses were made in the year under report. The number of successful grains obtained were:—

Male parent.	Female parent.	Number of grains obtained.
Shet Parner	Popatia	319
Popatia	Shet Parner	35
Do.	Dhola Katha	7
Dhola Katha	Popatia	38
Popatia	Wagia	9
Wagia	Popatia	42

Oil-seeds.

26. *Castors.*—Several varieties of castors were grown on a fairly large scale to compare their yielding capacities, but it was found that none surpassed the local Paras variety which gave an outturn at the rate of 1,092 lbs. of seed per acre. The trial was however somewhat interferred with owing to the fact that several varieties were partially damaged by frost. A comparison of this nature is however very difficult to carry out in practice owing to the liability of cross fertilization which apparently is a very common occurrence in castors.

In order to get pure strains, heads were covered with muslin bags and the following selected seed has thus been secured :—

Name of variety.	Number of selected heads.
Paras	1
Mota Paras	1
Purple stemmed Paras	1
Awnless	1
Chani	1
Moti Chani	1
Dharwar A	1
Dharwar B	1
Dharwar (small)	1
Dharwar (full size)	1
Indapur (white)	1
Sudapur (red)	1
Dindori	1
Nimar	1
Karjat	1
Madras	1
Brisbane	1

27. The seed of these varieties was kindly analysed by the Agricultural Chemist with the following results. The percentages of oil are less than those reported in paragraph 27 of last year's report :—

Name of variety.	Percentage of moisture.	Percentage of oil.
Paras	4·09	45·99
Mota Paras	3·41	48·72
Purple Stemmed Paras	3·11	48·18
Awnless (Mota Paras)	2·79	45·98
Chani	3·56	48·12
Mothi Chani	3·29	47·26
Dhárwár A	2·99	47·52
Dhárwár B	2·86	46·15
Dhárwár, small	2·79	45·93
Dhárwár, full sized	3·33	47·30
Indápur white	2·73	45·42
Indápur red	2·95	45·33
Dindori	3·14	48·14
Nimár	2·76	44·23
Karjat	3·03	47·14
Madras	2·93	48·63
Brisbane	3·56	48·12

28. *Til.*—A few varieties from different parts of the Presidency were compared with the local varieties but the latter appeared to be superior for the conditions prevailing at Nadiád. The yields obtained are tabulated below : —

Name of variety.	Percentage of oil to seed.	Percentage of moisture,	Yield of seed in lbs. per acre.
White local	47·25	4·40	440
Black local	49·30	4·35	432
Háveri	51·05	4·35	410
White Sholápur	52·28	4·46	352
White Nagar	46·50	5·05	320
White Kánara	52·46	4·72	240
White Dhárwár	50·29	4·81	240

29. It appears that cross fertilization in the field is quite common with this crop. Out of 52 flowers emasculated and left unprotected 22 became fertilized. This observation will be checked next season.

30. Selection was carried out with regard to the number of cells per capsule, and it was found that this was not a fixed character as capsules with a varying number of cells were found on one and the same plant. Seed out of six, eight, ten, twelve, sixteen and eighteen celled capsules has been obtained and will be sown next season. The number of seeds per tola from capsules possessing different numbers of cells was ascertained and found to vary from 3,200 to 4,800. Selection of prolific plants was also made and 10 superior plants were selected in each variety. The seed of each will be kept separate for sowing next season.

Pulses.

31. *Tur.*—Three introduced tur varieties were again grown in comparison with the several types of local tur. Bangalore and Biláspur turs both yielded about 900 lbs. per acre, while Indo-China tur gave an outturn of 848 lbs. of grain per acre. The local types yielded from 840 to 1,176 lbs. of grain per acre. Five sub-divisions have been made in the local tur. These are:—

1. White seeded.
2. Red seeded.
3. Black podded.
4. White podded.
5. Mottle podded.

These sub-divisions appear to present true types and it is found that the black podded variety is somewhat sweeter to the taste than the others. In the season under report 10 prolific plants have been selected in each variety and sub-division and the seed of these will be sown separately next season.

32. Similarly 10 prolific plants in each variety of guvar and Chola were selected in the year under report.

Crop pests.

33. *Hairy Caterpillars (Amsacta Moorrei).*—The most destructive pest of the season was these hairy caterpillars. They appeared in enormous numbers and destroyed the young crops of cotton, castors, til and bájri, etc. On the farm these caterpillars were hand picked and destroyed.

White ants (Termites).—These are a constant pest on the Nadiád Farm and damaged a number of crops as usual.

Blister beetle (Cantharis Tennuicollis).—These appeared in large numbers and were seen to damage the bájri flower heads.

Wilt disease.—Tobacco planted on new land suffered severely from an apparent wilt disease. More than half the plants were killed. No fungus has hitherto been identified and the wilting may be due to a physical cause as the soil sets very close after the rains and unless carefully stirred it is just possible that the plants die from a lack of æration and the effects of bad texture of the soil.

Vacumba (Orobranche nicotana).—This parasite was present as usual.

Rust *(Puccinia graminis)* was particularly severe on Dhola katha, Shet Parner and Wagia wheats.

SECTION II—MANURIAL EXPERIMENTS.

Manurial Experiment No. 1.

34. In this experiment several artificial manures are tested to ascertain whether they can in part be substituted for the heavy dressings of farm yard manure usually applied to tobacco. The experiment is carried out both with deep and shallow cultivation.*

The results obtained in the year under report are tabulated below, from which it will be seen that in every instance the deep cultivated plots have yielded better than those receiving shallow cultivation as was the case last year. The extra cost of the cultivation in the case of the deep ploughed plots amounts to about Rs. 2 per acre, while the increased gross profit runs from Rs. 9-1-0 to Rs. 11-10-0 per acre.

35. The conclusion arrived at in paragraph 36 of last year's report is confirmed by the results under report, *viz.*, that the most economical method of manuring tobacco seems to be the use of a combination of farm yard manure and castor cake. In the season under report 20,000 lbs. of farm yard manure plus 600 lbs. of castor cake has resulted in a nett gain of roughly Rs. 14 per acre over the use of 30,000 lbs. of farm yard manure only.

The conclusions arrived at in para. 37 of last year's report are also confirmed except that there is no indication that deep ploughing has enhanced the effects of castor cake, nitrate of potash and nitrate of soda. Castor cake as the sole manure for tobacco has again failed to give good results, while the two nitrogenous manures mentioned above have not produced any striking results, but it is clear that should farm yard manure become very scarce both these manures could be made to partially substitute it without causing either the yields or nett profits to materially diminish.

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* Shallow cultivation means that the land was ploughed with the country plough. Deep cultivation means that the land was ploughed with the CT2 iron plough.

36. The results obtained in the year under report are summarised below, and it should be pointed out that the crop was very regular in growth and while the cultivators' tobacco suffered severely from frost at the end of January, the farm crop sustained very little damage due to the foresight of the Superintendent, Mr. Tagare, who, when he observed the falling temperature, irrigated the land by working koses night and day, and it was observed that the plots irrigated four days before the coldest night suffered very little damage and also that the deep ploughed plots suffered less than the shallow cultivated plots.

Sallow cultivation.

No. of plot.	Area in gunthas	Manure.		Outturn per acre in lbs.	Value of produce per acre in rupees.	Cost of production per acre in rupees.	Remarks.
		Kind.	Quantity.				
					Rs. a. p.	Rs. a. p.	
1	10	Farm Yard Manure ...	15 tons ...	2,096	190 8 8	111 2 0	
2	10	Castor Cake ...	2,000 lbs. ...	1,888	171 10 0	118 5 8	
3	10	Farm Yard Manure ... + Castor Cake ..	10 tons ... + 600 lbs.	2,276	206 14 4	113 11 8	
4	10	Farm Yard Manure ... + Nitre ...	10 ton ... + 112 lbs.	2,008	182 8 8	114 2 8	
5	10	Farm Yard Manure ... + Sodium Nitrate ...	10 lbs. ... + 112 lbs.	2,080	189 1 4	112 14 8	

Deep cultivation.

No. of plot.	Area in gunthas	Manure.		Outturn per acre in lbs.	Value of produce per acre in rupees.	Cost of production per acre in rupees.	Remarks.
		Kind.	Quantity.				
					Rs. a. p.	Rs. a. p.	
12	10	Farm Yard Manure ...	15 tons ...	2,196	199 10 0	113 6 0	
13	10	Castor Cake ...	2,000 lbs. ...	1,938	180 11 4	120 9 8	
14	10	Farm Yard Manure ... + Castor Cake ...	10 tons ... + 600 lbs.	2,380	216 5 8	115 15 8	
15	10	Farm Yard Manure ... + Nitre ...	10 tons ... + 112 lbs.	2,136	194 2 8	113 6 8	
16	10	Farm Yard Manure ... + Sodium Nitrate ...	10 tons ... + 112 lbs.	2,188	193 14 4	115 2 8	

Manurial Experiment No. 2.

37. In this experiment the value of green manure is tested upon the tobacco crop. San (*Crotalaria juncea*) provides the green manure, and it is tried both when tobacco is grown every year continuously and also when tobacco is rotated with kodra mixture in alternate years. The general scheme of this experiment was described in para. 31 of the 1908-09 report. The results obtained in the year under report are tabulated below :—

No. of plot.	Area in gunthas.	Crop.	Tillage.	Kind of Manure.	Results per acre.			Rotation to the tobacco crop.	Remarks.
					Outturn in lbs. of cured tobacco.	Value of produce in rupees.	Cost of cultivation in rupees.		
						Rs. a. p.	Rs. a. p.		
23	10	Tobacco .	Ordinary ...	Green Manure of San.	1,540	140 0 0	86 9 0	No rotation.	
34	10	Do. ..	Deep ...	Do. ...	1,812	164 11 4	91 1 0	Do.	
25	10	Do. ...	Ordinary ...	Do. ...	1,776	161 7 0	86 9 0	Kodra mixture.	
36	10	Do. ...	Deep ...	Do. ...	1,964	178 8 8	91 1 0	Do.	
27	10	Do. ...	Ordinary ...	Farm Yard Manure.	2,068	188 0 0	115 14 0	Do.	
38	10	Do. ...	Deep ...	Do. ...	2,128	193 7 0	118 2 0	Do.	

38. It will be noted that the results vary from those obtained last year in that the tobacco grown on the rotated plots has yielded a greater outturn than that produced on the plot which grows tobacco continuously every year, but the yields on these latter plots should also be compared with those obtained on plots 1 and 12 in the preceding experiment, and it will then be seen that the comparison is not favourable to the use of the green manure as a complete substitute for farm yard manure. However when we compare green manuring with farm yard manure in the case of the rotated plots we find that also the gross yield of leaf on the farm yard manure plots is greater than that on the green manure plots; still the cost of green manure being considerably less than that of the farm yard manure enables a greater nett profit to be secured from the green manured plots.

It will be noted that the deep cultivated plots have given higher outturns in every case than the shallow cultivated plots in addition to leaving greater nett profits.

It was observed that the cured leaf from the green manured plots was whitish in colour and much milder in flavour, which however is not an advantage according to local taste.

Manurial Experiment No. 3.

39. This experiment is really a part of experiment No. 2 and consists of the trial of the residual effects of green manure and farm yard manure upon the rotation crop of kodra mixture. The results are tabulated below, but the kodra crop suffered a great deal from drought owing to the failure of late rains. It is fairly obvious, however, that farm yard manure leaves a superior residue to green manure which confirms last year's conclusions. The effect of previous deep ploughing for tobacco, is not apparent on the kodra crop.

Ordinary ploughing.						Deep ploughing.					
No. of plot.	Crop.	Yield per acre.		Value of produce.	Cost of cultivation.	No. of plot.	Crop.	Yield per acre.		Value of produce.	Cost of cultivation.
		Grain.	Fodder.					Grain.	Fodder.		
		Lbs.	Lbs.	Rs. a. p.	Rs. a. p.			Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
				Green	*manure.*						
24	Kodra ...	224	876	37 1 4	23 10 8	35	Kodra ...	384	1,480	46 2 0	25 14 8
	Tal ...	176	...				Tal ...	236	...		
	Tur ...	248	568				Tur ...	212	280		
	Sheria ...	88	(fibre) 36				Sheria ...	48	(fibre) 48		
				Farm	*yard m*	*anure.*					
26	Kodra ...	428	1,224	58 1 4	23 10 8	37	Kodra ...	492	1,284	51 4 8	25 14 8
	Tal ...	250	...				Tal ...	244	...		
	Tur ...	312	528				Tur ...	180	300		
	Sheria ...	152	(fibre) 92				Sheria ...	100	(fibre) 68		

Manurial Experiment No. 4.

40. In this experiment the relative values of three cakes, castor, safflower and cotton, upon tobacco are under trial. The plots receive a common dressing of 20,000 lbs. of farm yard manure per acre, and 1,000 lbs. of cake is applied as a top dressing. The results are summarised below, from which it will be seen that the yields on the cake plots are heavier by 100 to nearly 300 lbs. per acre of cured leaf than on the control plot and that castor cake has given the highest yield, but the crop was severely damaged by frost and hence no definite conclusions can be drawn in the year under report:—

Name of manure.	Yield. per acre.	Value of produce per acre.	Cost of production per acre.	Profit per acre.	Cost of additional cake.
	Lbs.	Rs. a. p.	Rs. a. p.	Rs a. p.	Rs. a. p.
Farm yard	1,560	141 12 8	99 5 4	41 7 4	.....
Cotton-seed cake	1,672	152 0 0	99 5 4	19 6 8	33 4 0
Safflower cake	1,784	162 2 8	99 5 4	32 4 8	30 0 0
Castor cake	1,824	165 12 8	99 5 4	44 7 4	22 0 0

Manurial Experiment No. 5.

41. The object of this experiment is the trial of nitre upon the rice crop both when grown with and without irrigation. The results obtained in the year under report are summarised below, from which it will be seen that the additions of one Bengal maund (80 lbs.) of nitre has greatly increased the yield of rice in both cases. The high cost of cultivation in the case of the irrigated rice is due to the fact that well water was used. A crop of Dhola wheat was taken in the cold weather, but owing to the damage caused by frost and rust the outturn was very poor.

No. of plot.	Manurial treatment per acre.	Crop in rains.	Yield per acre.		Value of produce per acre.	Cost of production per acre.
			Principal product.	Bye product.		
	Lbs.	*Irrigated.*	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
94	20,000 F. Y. M. + 80 Nitre.	Rice Sutarsal ...	2,893	3,953	99 2 8	78 13 2
95	20,000 F. Y. M. ...	Do. ...	2,120	3,184	73 5 4	72 15 0
		Non-Irrigated.				
90	20,000 F. Y. M. + 80 Nitre.	Rice Sutarsal ...	1,866	2,933	64 13 9	60 7 8
91	20,000 F. Y. M. ...	Do. ...	1,600	2,733	53 13 11	50 15 6

CULTURAL EXPERIMENTS.

Cultural Experiment No. 1.

42. In this experiment the advantage or otherwise of deep cultivation for the commonly cultivated kharif crops of Northern Guzerát is under investigation. By deep cultivation is meant ploughing the land once with the large turn-wrest plough (CT2 Plough), while by shallow cultivation is meant ploughing with the country wooden plough only. Each plot is ¼th of an acre in

area. The rotation is a three-year one and 15,000 lbs. of farm yard manure is applied once in three years to the bájri crop.

The results obtained in the year under report are tabulated below, from which it will be seen that slightly better results have been obtained on the deep ploughed plots in the case of the kodra mixture and sundhia jowár, but not so in the case of the bájri mixture which is in accordance with last year's results :—

Shallow cultivation.						Deep cultivation.					
No. of plot	Crop.	Yield per acre.		Value of produce per acre.	Cost of cultivation per acre.	No. of plot.	Crop.	Yield per acre.		Value of produce per acre.	Cost of cultivation per acre.
		Grain.	Fodder.					Grain.	Fodder.		
		Lbs.	Lbs.	Rs. a. p.	Rs. a. p.			Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
10	Bájri ...	496	2,308	42 0 4	34 11 0	21	Bájri ..	512	2,164	38 3 4	36 15 1
	Tur ...	280	552				Tur ...	172	380		
	Math ...	88	756				Math ...	68	724		
11	Kodra ...	188	1,152	56 0 8	23 11 4	22	Kodra ...	136	808	63 8 4	25 15 4
	Tal ...	246	...				Tal ...	326	...		
	Tur ...	488	552				Tur ...	380	456		
	Sheria ...	128	(fibre)88				Sheria ...	156	(fibre)136		
9	Sundhia ...	220	2,328	23 12 8	18 11 4	20	Sundhia ...	260	3,104	30 6 8	20 15 4

Cultural Experiment No. 2.

43. The object of this experiment is to ascertain the advantage if any of ploughing with an iron plough the gorádu soil of Nadiád in the hot weather and thus exposing the soil to the air and the effects of great heat. Accordingly two plots, each measuring ¼th of an acre, were selected and one of these was treated according to country practice, *i.e.*, ploughing with the local wooden plough after the rains had set in and just before sowing. Bájri was sown on both plots and the results are summarised below, from which it will be seen that the yield on the plot ploughed in the hot weather is considerably greater, but the results must be taken with caution as the yields on both the plots are much below normal.

No. of plot.	Crop.	Treatment.	Yield per acre.		Value of produce per acre.	Cost of cultivation per acre.
			Grain.	Fodder.		
			Lbs.	Lbs.	Rs. a p.	Rs. a. p.
102	Bájri ...	Ploughed in summer ...	516	2,348	28 7 4	18 10 4
104	Do. ...	Not ploughed in summer .	284	988	14 8 4	15 6 4

It was decided to discontinue experiment No. 2 described in paragraphs 50 and 51 of last year's report as the most suitable cotton for Nadiád has still to be worked out.

Cultural Experiment No. 3.

44. In this experiment the most profitable number of rice seedlings to transplant was under investigation. In local practice two or three seedlings are usually transplanted. Accordingly transplantations with bunches containing one, two and three seedlings were compared. The whole area was manured with 20,000 lbs. of farm yard manure per acre.

The results are tabulated below, from which it will be seen that the yields are in ascending order according to the larger number of seedlings planted which confirms last year's results :—

No. of plot.	Crop.	No. of Seedlings.	Yield per acre.	
			Grain.	Fodder.
			Lbs.	Lbs.
93A	Rice, Sutarsal	1	1,895	2,213
93B	Do.	2	2,030	2,357
93C	Do.	3	2,112	2,432

45. Experiments were also conducted on tobacco to ascertain—

(1) the effect of close planting, and

(2) the value of furrow irrigation as against bed irrigation,

but owing to the unfavourable season no reliable results could be obtained.

ROTATIONAL EXPERIMENTS.

Rotational Experiment No. 1.

46. The system of growing mixed crops is very much in vogue in Northern Guzerát. An experiment to ascertain the relative advantages of this system over single cropping was again conducted in the year under report when pure crops of kodra, bájri, bávto, etc., were compared with their common mixtures. The results of such an investigation can only be accepted after a series of years because one advantage of mixed cropping lies in the security it gives against serious damage to any one crop in a particular year.

47. The results obtained in the year under report are tabulated below, from which it will be seen that they are at variance in some instances with last year's results. Kodra alone, although giving a fair yield, has not left so much profit as kodra mixture owing to the low yield of grain due to the absence of late rains and to the relatively low value of kodra grain as compared with that of tur and til. Bájri did badly in both cases owing to the failure of late rains. In bájri mixture the crops of mug and math withered away in the beginning of November.

Bávto grown as a single crop did not yield so well as when grown as a mixed crop, because in the latter case this crop has the advantage of a larger area as the castors and wal do not seriously interfere with it.

Single crops.							Mixed crops.					
Groups.	No. of plot.	Crop.	Yield per acre.		Value of produce per acre.	Cost of cultivation per acre.	No. of plot.	Crop.	Yield per acre.		Cost of produce per acre.	Cost of cultivation per acre.
			Principal product.	Bye-product.					Principal product.	Bye-product.		
			Lbs.	Lbs.	Rs. a. p.	Rs. a p.			Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
I	43	Kodra ...	1,208	2,632	30 13 0	14 0 4	32	Kodra ..	328	1,152	59 8 8	25 5 4
								Tal ..	280	...		
								Tur ...	532	880		
								Sheria ...	76	(fibre)40		
II	42	Bájri ...	532	2,788	30 0 0	33 2 4	31	Bájri ...	464	2,016	31 8 8	34 0 0
								Tur ...	48	172		
								Math ...	40	320		
								Mug ...	24	360		
III	44	Bávto* ...	504	1,824	31 13 8	22 1 0	33	Bávto ...	1,276	5,604	81 0 0	37 5 0
		Castors ...	150	...				Castors ...	432	...		
		Wál grain .	40	...				Wál grain .	56	...		
		Pods ...	132	...				Pods ...	108	...		

* The yield of each crop on plot 44 is calculated for ⅓rd of an acre as it was equally divided between Bávto, Castors and Wál.

Rotational Experiment No. 2.

48. In this experiment bájri and kodra mixtures grown continuously are compared with the same mixtures grown as a two-year rotation. The results of such an investigation will not be definite until the work has been continued over a series of years. The results obtained in the year under report are tabulated below:—

Group of plot.	Rotation.	No. of plot.	Crop.	Yield per acre.		Value of produce per acre.	Cost of production per acre.
				Principal product.	Bye-product.		
				Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
I	Continuous bájri mixture.	137	Bájri ...	408	2,720	31 8 8	25 10 8
			Mug ...	48	160		
			Math ...	8	160		
			Tur ...	96	440		
II	Bájri mixture and kodra mixture in rotation.	138	Bájri ...	472	1,952	30 8 0	25 10 8
			Mug ...	56	144		
			Math ...	12	312		
			Tur ...	24	160		
		139	Kodra ...	536	2,064	60 6 0	30 4 0
			Tal ...	188	...		
			Tur ...	424	640		
			Sheria ...	152	(fibre)112		
III	Continuous kodra mixture.	140	Kodra ...	320	1,232	39 10 8	30 4 0
			Tal ...	116	...		
			Tur ...	368	416		
			Sheria ...	64	(fibre) 80		

Control Plots.

49. According to Government Resolution No. 8241, dated 20th August 1907, four plots were set aside to compare the yields of bájri and kodra mixture when treated according to the ordinary local methods with those when the land is well manured. The results obtained with bájri are as under :—

No. of plot.	Treatment.	Crop.	Yield per acre.		Value of produce per acre.	Cost of produce per acre.
			Grain.	Fodder.		
			Lbs.	Lbs	Rs. a. p.	Rs. a. p.
123A	No manure ...	Bájri	718	3,005	39 10 1	22 9 1
123B	Farm yard manure, 15,000 lbs.	Do.	844	4,116	47 3 4	41 15 4

Bájri without manure was a 9½ anna crop, while bájri with manure was 10½ anna crop. Both the crops suffered for want of late rains. The heavy manuring has not left an increased nett profit.

50. The results obtained with kodra mixture are as under :—

No. of plot.	Treatment.	Crop.	Yield per acre.		Value of produce per acre.	Cost of cultivation per acre.
			Grain.	Fodder.		
			Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
124A	No manure ...	Kodra ...	340	1,180	74 7 8	37 6 0
		Tal ...	372	...		
		Tur ...	828	1,156		
		Sheria ...	45	(fibre) 24		
124B	Farm yard manure 15,000 lbs. per acre.	Kodra ...	508	2,180	94 13 0	54 13 8
		Tal ...	428	...		
		Tur ...	1,040	1,508		
		Sheria ...	28	(fibre) 56		

On the unmanured plot kodra was a 3-anna crop, tal 7½ annas, tur 14 annas and sheria was a poor crop. On the manured plot kodra was an 8-anna crop, tal 8½ annas, and tur 16½ annas. The heavy manuring has left a small increased nett profit.

APPENDIX A.

The following table gives the details of the analysis of manures used on the farm.

Kind of manure.	Nitrogen.	Phosphoric acid.	Potash.	Remarks.
	Per cent.	Per cent.	Per cent.	
Farm yard manure ...	0·58	0·89	0·82	
Nitre*	4·12	...	10·56	22·66 per cent. of Nitre.
Sodium Nitrate*	6·35	...	...	38·49 per cent. of Sodium Nitrate.
Pottasium Sulphate ...	...	...	49·50	91·53 per cent. Potassium Sulphate.
Castor cake	4·27	4·62	1·36	
Safflower cake	6·56	2·19	2·41	
Cotton-seed cake	4·26	2·53	1·25	
Wood ash	...	...	3·88	

* These manures are mixed with ashes for storage purposes.

APPENDIX B.

The following statement gives the details of analysis of water of the farm well used for irrigation purposes.

	Parts per 100,000.
Sodium Carbonate ...	10·21
Calcium Carbonate ...	8·00
Magnesium Carbonate ...	29·45
Magnesium Sulphate ...	Nil.
Sodium Sulphate ...	9·13
Magnesium Chloride ...	Nil.
Sodium Chloride ...	74·01

APPENDIX C.

Enquiries.

Generally the cultivators on this side do not make written enquiries; however the following enquiries were made and all of them were answered by the Superintendent, Mr. D. H. Tagare :—

No.	Subject of enquiry.	Places from which enquiry was made.
1	Chain pump ...	Ahmedabad, Kaira.
2	Iron plough ...	Kálol, Ahmedabad, Sánand, Tambakudi, Khodiar, Petlad.
3	Hand chaff-cutters ...	Ahmedabad, Gatrad.
4	Cotton seeds ...	Paldi, Ahmedabad, Daskroi.
5	Bájro ...	Ahmedabad.
6	Jowár ...	Sánand, Trasad, Shelavadad, Panwel, Surat.
7	Agricultural pamphlet ...	Paneli Moti, Ahmedabad, Shankheda.
8	Tobacco ...	Ahmedabad, Anand, Amalner.
9	Engine ...	Ahmedabad.
10	Artificial manure ...	Válvod, Virsad, Sojitra.
11	Sugarcane ...	Ahmedabad, Bakrol.
12	Lemons ...	Ahmedabad.
13	Orange ...	Ahmedabad.

APPENDIX D.

The following seeds, implements, and manures were distributed from the farm to *cultivators only* during the year under report :—

Seeds—	
Jowár	1,510 lbs.
Cotton	121¼ lbs.
Implements—	
Hand chaff-cutters	4
CT2 ploughs	5
BT2 ploughs	7
Plough shares	31
AT2 ploughs	2
Hand cultivators	4
Manures—	
Castor-cake	300 lbs.
Potassium-sulphate	280 lbs.
Superphosphate...	250 lbs.
Ammonium-sulphate	180 lbs.
Nitre	110 lbs.

APPENDIX E.

(*Vide* Government Resolution No. 8241, dated 20th August 1907.)

Note on the farm crops versus *cultivators' crops.*

Bájri.—Owing to the commencement of early monsoon the early sown bájri was a total failure in the district. The farm crop was not affected. The maximum yield of bájri on the farm during the season was 1,080 lbs. The maximum yield in the district was less than 600 lbs. per acre.

Tobacco.—The crop was very even on the farm. The farm crop was not damaged by frost as was largely the case in cultivators' fields.

Castors.—Very fine crops of the several varieties of castors were grown on the farm which are very rarely seen in the district.

(Signed) D. H. TAGARE,
Superintendent.

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ANNUAL REPORT
ON THE
EXPERIMENTAL WORK
OF THE
NADIAD AGRICULTURAL STATION
(Kaira District)

FOR THE YEAR

1913-1914

BY

Rao Saheb G. K. KELKAR,
Ag. Deputy Director of Agriculture, Bombay Presidency.

POONA:
Printed at the Yeravda Prison Press.

1915.

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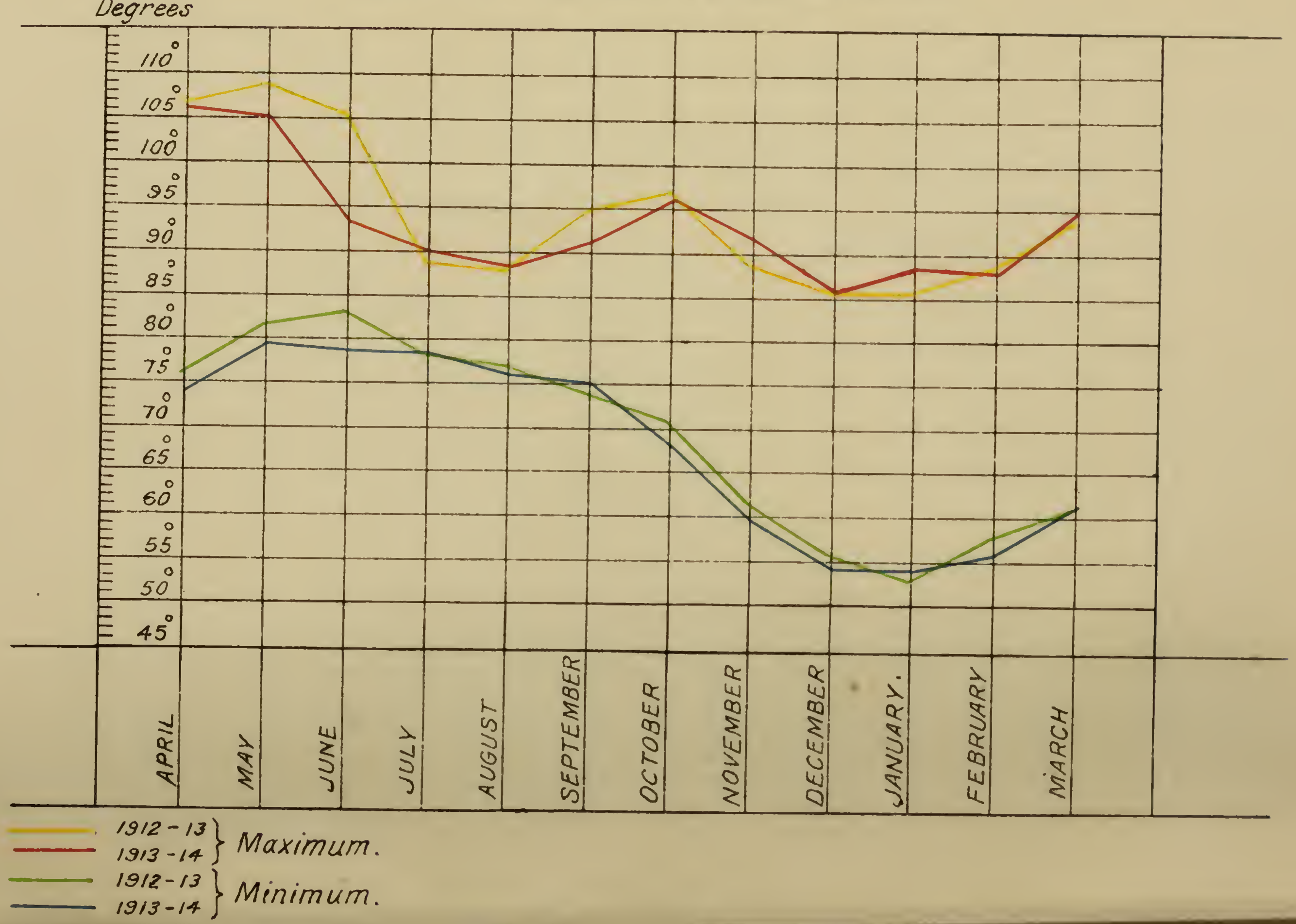

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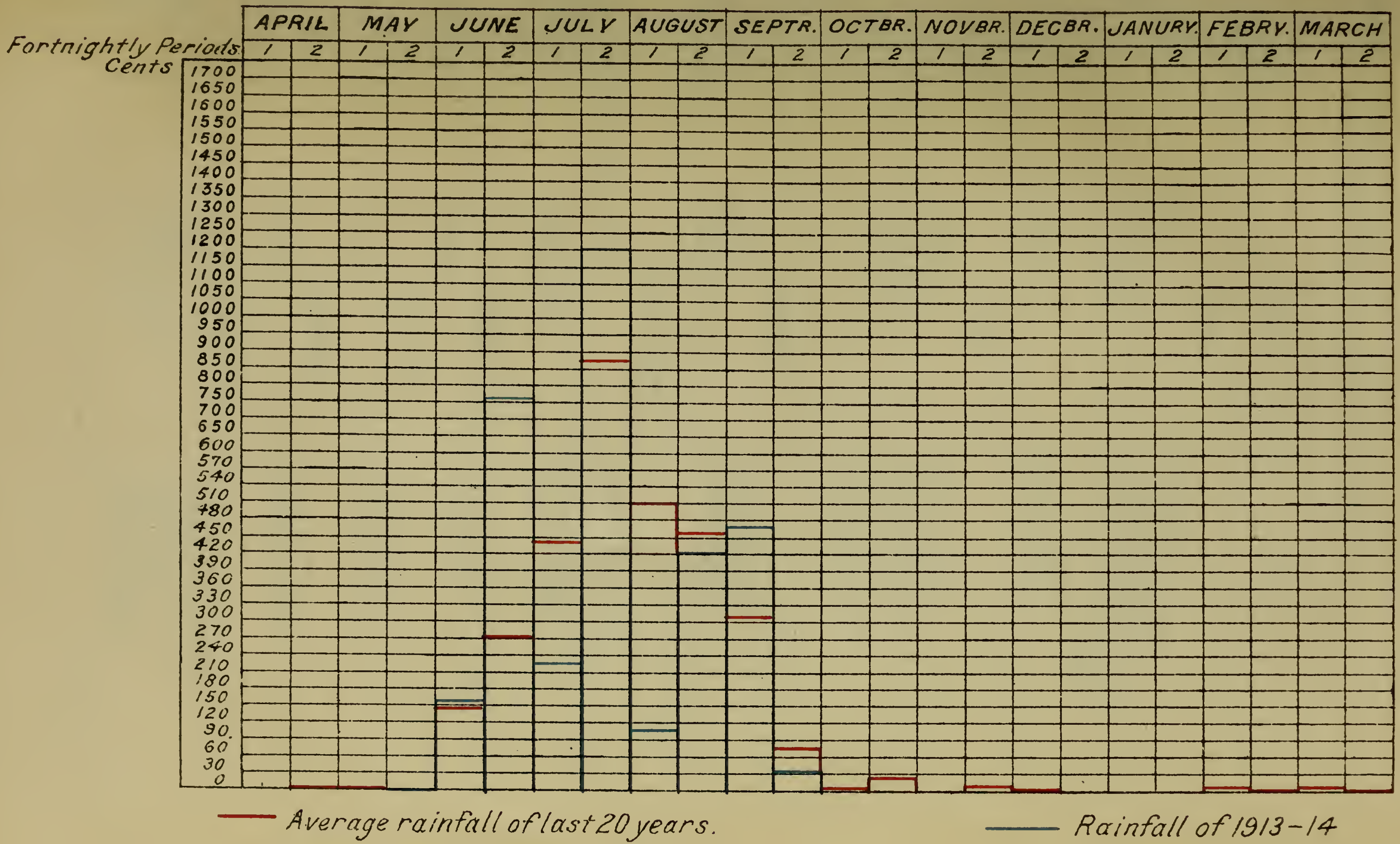
1913-14.

NADIAD AGRICULTURAL STATION.



Vernacular names of crops, &c. mentioned in the report with their Botanical and English equivalents.

Vernacular.	English.	Botanical.
	Cereals.	
Dangar, Bhat	Rice	Oryza sativa.
Bajri, Bajro	Bulrush millet	Pennisetum typhoideum.
Kodra	Kodra millet	Paspalum scrobiculatum.
Jowar	Great millet	Andropogon sorghum, var. vulgare.
Sundhia	Do.	Do var. cernum.
Bavto	Murva millet	Eleusine coracana.
Ghau	Wheat	Triticum vulgare.
	Pulses.	
Tur	Pigeon pea	Cajanus indicus.
Mug	Green gram	Phaseolus mungo.
Wal	Indian gram	Dolichos lablab.
Guvar	Cluster bean	Cyamopsis psoralioides.
	Soy beans	Glycine hispida.
Math		Phaseolus aconitifolius.
Choli		Vigna catiang.
	Oil-seeds.	
Til	Sesamum	Sesamum indicum.
Diveli	Castors	Ricinus communis.
Bhoising, Mugfali	Groundnut	Arachis Hypogœa.
	Fibre plants.	
Broach or Kanam, Ghogari, Lalio, Buri, Cambodia, Bourbon.	Cottons	Gossypium herbaceum.
Sheria, Ambadi	Brown hemp	Hibiscus cannabinus.
San	Bombay hemp	Crotolaria juncia.
	Condiments.	
Kanda, Dungli	Onions	Allium cepa.
	Narcotics.	
Tamaku	Tobacco	Nicotiana tabacum.
	Vegetable.	
Batata	Potato	Solanum tuberosum.
	Fodder crops.	
Berseem	Egyptian clover	Trifolium Alaxandrium.
Makai	Maize	Zea mays.
Kang	Italian millet	Setaria italica.
Cheno	Inferior millet	Panicum miliaceum.
Banti	Do.	Panicum Crusgalli.

THE NADIAD AGRICULTURAL STATION.

1913-14.

Established in 1903; North Latitude—22°; East Longitude—73°; Elevation—approximately sea level; Soil—alluvial loam (vernacular-Goradu); Average (past 20 years) rainfall 31 inches 62 cents; Average (past 8 years) temperature mean maximum 106·5°-F. in May and mean minimum 51·2°-F. in January.

Area—44 acres.

Superintendent—Mr. T. M. Thakar, L.Ag.

Season.

2. The appended diagram and the graph show the rainfall and the temperature during the year under report. The total rainfall of the year amounted to 34·16 inches, a little more than the average. The number of rainy days was 59. The season commenced rather early. About 2 inches of rain was recorded by the 15th of June when sowing of San and Kodra mixtures were taken in hand. Bajri and cotton were sown in the last week of the month. But the heavy showers on the last days of June necessitated the resowings of bajri in certain plots. The second fortnight of July had rain almost every day. On the 20th and 21st the rainfall was heavy measuring 5·08 inches which flooded the fields and damaged the resown bajri area. The crop remained stunted and irregular throughout the growing period. The first sown bajri which had very vigorous growth suffered and lodged by the heavy showers of September. The cottons on the farm grew well but suffered from the attacks of Katras and from the root rot (Fusarium) when the fields got water logged. They also suffered from wilt, white-ants, leaf rollers and boll worms at various stages. The rats and aphides had also their share. The May sown cottons withstood the attacks while the rain fed and unirrigated suffered the most from the above mentioned pests.

Tobacco seedlings suffered much from the stem borers and from rotting due to continuous rainy weather. The white Burley variety suffered the most and ultimately proved a failure.

Soy beans, pulses and til were completely destroyed by Katras.

The smut in bajri and rust in wheat were prominent during the year and reduced the yield considerably.

3. The experimental work of the year is reported under the following sections:—*

Section I.—Crop experiments.
„ II.—Manurial experiments.
„ III.—Cultural experiments.
„ IV.—Rotational experiments.

---

* All calculations are made exclusive of rent and taxes.

SECTION I.—CROP EXPERIMENTS.

Tobacco.

4. The usual varieties of tobacco were again grown during the year. The white Burley appears to be a delicate variety and has proved a total failure owing to the seedlings being much affected by stem-borers. The other two also suffered to some extent. The general crop in the district was reported to be below average.

The other varieties (Yellow Mammoth, yellow Kentucky, Yellow Prior, white stem Oronoco, Hestor, Conqueror and Ayasolouk) were also under observation and appeared to deteriorate under the climatic conditions prevailing at Nadiad. The leaf is getting thick and gummy and the texture coarse.

The results of Cavalla and the local are tabulated below :—

Plot Nos.		Area of each Plot in Gunthas.	Name of Variety.	Date on which transplanted.	Yield of cured leaf in lbs. per acre.		
Original	Duplicate.				Original.	Duplicate.	Average.
6-17	28-39	20	Cavalla ...	21st to 24th August.	737	814	775½
7-18	29-40	20	Local ...	Do.	1,158	1,254	1,206

5. The outturn of Cavalla is very poor. It is an early ripening and a narrow-leafed variety. Both the local and Cavalla were barncured and the colour developed was dark. While curing it was observed that the leaves began to rot at the point of attachment to the stem and were falling off.

6. The experiment of manuring heavily to increase potash in the leaf as described in para. 6 of 1911-12 report was continued.

The results of analysis* are noted in the statement on page 3.

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*All the analyses referred to in this report were kindly made by the Agricultural Chemist to the Government of Bombay.

STATEMENT I.

Percentage Composition of Tobacco leaf, the crop of which had been manured with—

Kind.	Quantity per acre in addition to 20,000 lbs. farm yard manure.														
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Sulphate of Potash = K_2O ...	100	100	100	50	50	50	...	...	...	...	...	...	...	...	...
Wood Ashes = K_2O ...	...	...	...	...	...	...	100	100	100	50	50	50	...	...	...
Superphoshate ...	...	300	300	...	300	300	...	300	300	...	300	300	...	300	300
Sodium nitrate ...	...	...	200	...	...	200	...	...	200	...	...	200	...	...	200

Ash.	Per cent. 23·48	Per cent. 22·48	Per cent. 21·53	Per cent. 22·08	Per cent. 24·36	Per cent. 23·08	Per cent. 21·60	Per cent. 25·20	Per cent. 23·96	Per cent. 23·92	Per cent 24·56	Per cent. 22·12	Per cent. 25·28	Per cent. 24·92	Per cent. 22·96
Containing Sand ...	4·48	3·96	3·28	3·44	3·76	2·16	2·36	4·92	4·44	4·40	4·39	2·32	2·96	3·40	3·20
,, Lime ...	5·04	4·84	2·82	5·38	4·54	5·71	4·90	5·64	4·16	6·61	5·17	4·03	4·77	4·57	6·24
,, Potash ...	0·82	0·97	0·82	0·85	0·74	0·89	0·97	0·82	0·89	0·85	0·77	0·89	0·97	0·82	0·85
,, Magnesia ...	2·59	3·31	1·73	2·38	2·48	2·30	3·24	2·95	2·52	2·95	3·24	2·45	3·46	3·17	3·38
,, Sulphuric acid ...	1·16	1·16	0·82	0·95	0·95	0·88	2·22	1·09	1·22	1·09	1·02	1·09	1·02	1·09	1·22
,, Chlorine ...	3·78	3·36	1·82	2·66	3·50	3·08	3·50	3·36	3·08	2·80	3·08	3·22	3·08	2·94	3·50

STATEMENT II.

Percentage Composition of Ash.

Manurial Treatment.	Percentage to total Ash of				Total Ash.
	Potash. K_2O	Lime. C_aO	Sulphuric acid.	Chlorine	
100 lbs. K_2O in Sulphate of Potash.	3·49	21·46	4·92	16·10	23·48
100 lbs. K_2O in Sulphate of Potash. 300 lbs. Superphosphate ...	4·31	21·53	5·16	14·95	22·48
100 lbs. K_2O in Sulphate of Potash. 300 lbs. Superphosphate ... 200 lbs. Sodium nitrate ...	3·81	13·10	3·81	8·45	21·53
50 lbs. K_2O in Sulphate of Potash...	3·85	24·37	4·30	12·05	22·08
50 lbs. K_2O in Sulphate of Potash... 300 lbs. Superphosphate ...	3·04	18·64	3·90	14·37	24·36
50 lbs. K_2O in Sulphate of Potash. 300 lbs. Superphosphate ... 200 lbs. Sodium nitrate ...	3·86	24·74	3·81	13·34	23·08
100 lbs. K_2O in Wood ashes ...	4·49	22.69	10·28	16·20	21·60
100 lbs. K_2O in Wood ashes ... 300 lbs. Superphosphate ...	3·25	22·38	4·32	13·33	25·20
100 lbs. K_2O in Wood ashes ... 300 lbs. Superphosphate ... 200 lbs. Sodium nitrate ...	3·71	17·36	5·09	12·86	23·96
50 lbs. K_2O in Wood ashes ...	3·55	27·63	4·56	11·71	23·92
50 lbs. K_2O in Wood ashes ... 300 lbs Superphosphate ...	3·13	21·05	4·15	12·54	24·56
50 lbs. K_2O in Wood ashes ... 300 lbs. Superphosphate ... 200 lbs. Sodium nitrate ...	4·02	18·22	4·93	14·56	22·12
No artificials ...	3·84	18·87	4·03	12·18	25·28
300 lbs. Superphosphate ...	3·29	18·33	4·37	11·80	24·92
300 lbs. Superphosphate ... 200 lbs. Sodium nitrate ...	3·70	27·09	5·31	15·24	22·96

The percentage of ash is rather low though the percentage of sand has decreased quite satisfactorily. Lime percentages are good enough except in the case of complete manure with 100 lbs. K_2O in sulphate of potash. The percentages of sulphuric acid and chlorine are very high and those of potash are very poor in all cases.

7. The water of the farm well is very brackish containing injurious salts. The percentage of sodium chloride alone is 62½ parts per 100,000 parts. This amounts to a doze of 75 lbs. of sodium chloride per acre in three waterings given to the tobacco crop. (The total quantity of water applied in three waterings comes to nearly 120,000 gallons per acre.)

Cotton.

8. The experiments with Cambodia, Lalio, Buri, &c., were continued during the year. They were grown for comparative purposes under the following conditions :—

I. Sown in May with the help of irrigation.
II. Sown at the beginning of the monsoon.

(*a*) Not to be irrigated in the cold weather;
(*b*) To be once or twice irrigated in the cold weather.

The May sown crop received three waterings for starting and it grew vigorously.

The rainfed varieties were damaged by root rot, wilt and white-ants. The May sown suffered from Katras (hairy caterpillar) to a slight extent. The character of the season caused the bolls of all the cottons excepting Buri to ripen late and the opening of the bolls was also irregular. Consequently the cotton had to be picked several times in small quantities.

On account of the early beginning of the monsoon the difference between two sowings (May and monsoon) was very slight, *viz.*, 20 days. Hence the results obtained are not very marked when compared with those of the last year.

The following statement shows the outturns obtained : –

Name of Variety.	Yield of Seed Cotton in lbs. per acre.			Ginning percentages.		
	I.	II*a*.	II*b*.	I.	II*a*.	II*b*.
Buri ...	1,022	586	410	28·85	28·84	30·48
Cambodia ...	897	398	406	32·87	32·76	32·59
Lalio ...	1,263	346	916	34·34	35·19	36·08
Selection I (Broach) ...	...	566	794	...	30·07	31·67
Ghoghari ...	...	960	1,036	...	36·90	37·77

9. The observations recorded in the last year's report, para. 13, are confirmed during the year. However, the May sown cottons were earlier in ripening by about a fortnight and most of the produce was picked during January, but they continued to yield till the end of April.

The monsoon crops of Cambodia (*IIb*) irrigated in winter, (II*a*) unirrigated, do not show marked difference in yield.

With regard to the May sown cottons Lalio gives the highest yield while Buri surpasses Cambodia in yield as reported in 1910-11, 1911-12.

Among monsoon sown crops Ghoghari has yielded the best.

The comparative averages of the yield and ginning percentages of these cottons sown under different conditions for the past 4 years are tabulated below: —

Name of Variety.	Average yield of Seed Cotton in lbs. per acre (1910-11 to 1913-14 both inclusive).			Average ginning percentage for years 1910-11 to 1913-14, both inclusive.		
	I	II*a*.	II*b*.	I.	II*a*.	II*b*,
Buri ...	846	442	577¾	30·19	29·68	29·74
Cambodia ...	839¼	329¼	565¼	32·89	33·11	32·40
Lalio ...	1,022	537	563	32·7	34·07	34·72
Selection I (Broach) ...	...	362	619	...	30·24	31·16
Ghoghari ...	...	417	810	...	37·07	37·08

10. The exotics Buri and Cambodia do not compare favourably with the local Lalio even under the May sown conditions. When sown during monsoon they do not show any greater yield than the indigenous varieties. Buri yields steadily, but has a much lower ginning percentage. Ghoghari competes much favourably with Lalio and has an advantage over Lalio in its higher ginning.

11. It was observed in para. 14 of the last year's report that Cambodia obtained from Messrs. Binny & Co., Madras, gave a very low ginning. The same seeds sown at Bavla (Ahmedabad District) and Dohad gave better ginning last year. The seeds from all the above mentioned places were brought and sown on the farm during the year under report. The results of ginning of these three are very nearly equal.

The yield and ginning percentages are tabulated below:—

Name of the place whence the seed was obtained.	Yield in lbs. of seed cotton per acre.	Ginning percentage.	Remarks.
Nadiad ...	897	32·87	Originally obtained from Madras in 1912-13.
Bavla ...	790	31·89	
Dohad ...	618	33·67	
Original seed of Nadiad farm ...	743	33·22	
Gadag ...	1,041	33·53	

12. The Department distributed about 2,000 lbs. of Cambodia seed obtained from Gadag amongst the cultivators of Kaira and Ahmedabad Districts. The demand for seed was very great and the cultivators at Bavla and other places who had obtained and sown Cambodia during 1912-13 sold their seeds at abnormally high rates.

It was just for this purpose that a large area of 5 acres, 26½ gunthas was grown with Cambodia seed obtained from Gadag, where it is reported to have given higher ginning up to 40·5 per cent. The Gadag seed contained some impurity of Dharwar—American and other types. This was purified by the Cotton Supervisor. The mixture percentage was about 6 per cent.

The average yield per acre came to 565·8 lbs. with a ginning percentage of 33·35, which is much below the mark. Some plots have yielded very high as much as about 1,041 lbs. per acre. The average low yield is due to several insect pests and diseases already mentioned.

13. Duplicate samples of these cottons were sent for valuation to Bombay Cotton Trades Association and to Messrs. Tata Sons & Co., Bombay, and were reported on the 17th and 27th June 1914, respectively, as summarized below:—

Name of Variety.	Approximate market value in Rs. per Candy of 784 lbs.		Remarks by	
	By the Bombay Cotton Trades Association.	By Messrs. Tata, Sons & Co.	The Bombay Cotton Trades Association.	Messrs. Tata, Sons & Co.
Lalio ...	310	260	Staple fair to good ...	This Cotton shows deterioration on Nadiad farm.
Cambodia ...	350	275	Colour good, staple good and strong.	This also has deteriorated considerably.
Buri ...	325	255	Colour good, staple silky but not long.	This also shows deterioration and is very irregular.

Note.—The basis for the valuations taken by the Bombay Cotton Trades Association on 17th June 1914 was :—

Broach fine	... Rs. 300.
Surat fine	... Rs 325.
Navsari fine	... Rs. 340.

and by Messrs. Tata Sons & Co. on 27th June 1914 :—

Surat	... Rs. 315.	Navsari	...Rs. 335.
Broach	... Rs. 290.	Fine Dhollera	...Rs. 270.
Madras Cambodia	... Rs. 330.		

It will be seen that this year also the Cambodia is valued the best as before while Buri though valued better than Lalio is shorter in fibre. Though both the valuers agree in putting Cambodia first but they differ in their valuations considerably. The deterioration pointed out in the valuation of Messrs. Tata, Sons & Co., may not be taken to be conclusive as last year's spinning tests made by the same firm show Cambodia to be slightly inferior to Surti-Broach and Selection 1.

14. This year's results in spinning tests agree with those of last year.

Bourbon Cotton.

15. The type 23 T mentioned in para. 19 of the last year's report was allowed to stand during the year. But the plantation did not fare well and so it was grubbed up.

Selection and Hybridization.

16. Out of the Hybrid plants selected and referred to in para. 23 of the last year's report, some of the individually picked plants of 2^{4} and 2^{26} produced vigorous offsprings with good quality of fibre and tolerably good ginning. These have been kept for future trial and the rest rejected.

The following statement summarizes the results:—

Register number of the Hybrid.	Plant No. selected in			Registered in 1913-14 as	Weight of seed secured in 1913-14 in Tolas.	Ginning percentage in 1913-14.
	1910-11.	1911-12.	1912-13.			
1,379	2	4	1	1	14¼	31·32
			2	2	3½	34·88
			3	3	12¼	33·78
			5	4	38	29·39
			6	5	28¾	30·93
			7	6	13½	32·07
		26	11	1	12½	28·55
			14	2	39	27·61
			16	3	5¼	26·72

17. The hybrids between Lalio and Comilla cottons referred to in para. 26 of the last year's report were sown during the year, but they produced fibre like Comilla and hence rejected.

18. The new crosses of Cambodia and Buri with Abassi referred to in para. 27 of the last year's report were sown during the year. Out of these crosses a few plants having good ginning and fibre were selected and are retained for further trial. The plants selected with their ginning percentages are tabulated on page 9.

Name of the Hybrid.	Boll number of 1912-13.	Plant No. of 19'3-14 in F_1 Generation.	Weight of Seed in Tolas available for sowing in 1914-15.	Ginning percentage.	Remarks.
Abassi × Buri ...	I	5	1¼	29·03	
	III	4	½	...	Very little seed.
	IV	5	1¼	32·14	Black seed.
	VII	4	2½	27·58	
	IX	5	½	...	Very little seed.
	XIII	2	2	31·25	
	XIV	1	1¼	33·33	
	XVII	5	¾	...	"
Buri × Abassi ...	I	3	3	36·48	Half the seed green in colour.
Abassi × Cambodia.	I	4	1	32·65	
		5	3	29·57	
	III	5	6½	33·54	Black seed.
	IV	3	3	32·35	
	V	5	1	32·75	
	VII	3	¾	31·57	
	VIII	1	2¾	32·81	Half the seed black in colour.
	IX	5	2	34·0	Seed green in colour.
	XI	2	4	30·33	
		5	2½	31·14	
	XIII	4	5¼	29·06	
		5	1½	30·55	
	XIV	1	3¼	28·37	
	XVI	5	2¼	32·75	
	XIX	5	4	30·85	Seed green in colour.
	XXIII	5	4	30·52	
	XXV	3	2	30·43	
Cambodia × Abassi.	I	5	3¾	35·1	
	III	3	2¾	34·32	Black seed.
	IV	4	1	29·17	

Wheat.

19. Four varieties of wheat, *viz.*, Tamra, Bansi of West Khandesh. Dhola and Popatia were tried on a large scale, half an acre of each. The rust and smut diseases prevailed very seriously in all the varieties more so in Dhola and Bansi. Popatia considered as rust resistant variety was also affected. Owing to these diseases the irrigation was withheld for a short period to Dhola and Bansi. During the time these were attacked by white-ants and stem-borers materially reducing the yield. The results being not reliable and comparable are not reported.

Selection,

20. The work of selection on spikelets and tillering in Dhola and Popatia varieties was continued during the year. For rust resistance, the two varieties worked upon are Dhola and Shet Parner. These got very much rusted during the year under report and are therefore rejected. The results are shown in the Appendices Nos. X and XI.

The collection of 13 varieties of wheats from the Presidency are grown and are under observation. These also were very much affected by rust.

Hybridization.

21. The cross of Wagia × Popatia mentioned in para. 31 of last year's report has reached the F_3 generation during the year. Here also there was much rust. All the heads were Wagia-like. Only two plants which resisted the rust to some extent have been preserved.

22. The crosses Dhola × Popatia and Shet Parner × Popatia referred to in para. 32 of last year's report are grown and have reached the F_2 generation. All the plants had female Popatia characters and hence they are rejected.

23. The natural crosses observed and found in the crop of 1912-13 as mentioned in last year's report, para. 34, were grown. The characters were minutely observed and are detailed below :—

One ear head in Dhola.—All heads appear like Popatia..

Two ear heads in Popatia.—In both the rows all heads are Popatia-like.

One ear head in Wagia.—All heads are Dhola-like.

24. The new crosses made in 1912-13 and referred to in para. 33 of last year's report reached the F_1 generation during the year. The results are noted as under :—

Name of Parents.		Number of plants retained in 1913-14.	Remarks.
Male.	Female.		
Dhola ...	Popatia ...	3 + 5	Three plants Dhola-like having rust and five Popatia-like having no rust have been observed.
Popatia ...	Dhola ...	2	One plant Popatia-like and one plant Dhola-like having much rust.

Out of the plants crossed last year between Popatia × Dhola one having only one grain did not germinate.

Bajri.

25. The awned variety of Bajri was grown on a large scale during the year in 2 acres. It grew very luxuriantly but was lodged owing to heavy rains followed by wind during the month of September. The yield came to 505 lbs. of grain and 5,347 lbs. of fodder per acre.

26. The awned Bajri was also tried with local, Baroda and Bhavnagri Bajro. The yield was below normal in all the cases for reasons already stated in the general remarks above. The results are tabulated below :—

Name of the Bajri variety.	Yield per acre in lbs.		Remarks.
	Grain.	Fodder.	
Bajri, local ...	520	4,460	
Bajri, Baroda ...	160	2,220	
Bajro Bhavnagri ...	136	1,920	
Bajri, awned ...	200	3,000	

Selection.

27. A fresh start has been made with Bajri selection during the year and heads are selected for having good grain, good tillering and smut resisting characters. They are tabulated below :—

Name of variety.	Serial No. of plant.	No. of tillers.	No. of ear heads obtained.	Remarks.
Deshi (local) ...	1	33	10	
	2	32	8	
	3	22	7	
	4	13	9	
	5	14	7	
	6	11	6	
	7	13	5	
	8	12	5	
Awned ...	1	25	5	
	2	20	5	
	3	17	7	
	4	21	5	

Name of variety.	Serial No. of plant.	No. of tillers.	No. of ear heads obtained.	Remarks.
Awned—*contd.*	5	26	3	
	6	21	4	
	7	15	6	
	8	16	4	
Bajro ...	1	19	3	
	2	16	2	
	3	9	2	
	4	7	3	
Baroda ...	1	24	5	
	2	19	5	
	3	12	3	
	4	8	4	

OIL SEEDS.

Castors.

28. Eleven varieties of castors mentioned in the last year's report were grown on one guntha each. Out of these the Madras, Dohad A, and Dindori are very poor yielders. The awnless variety is not a pure one. It developed awns during the year though to a less degree than others. These four varieties are therefore rejected.

The following table shows the yield of castor varieties and the percentage of oil obtained by chemical analysis and by the country Ghani :—

Name of the Castor variety.	Yield in lbs. per acre.	Percentage of oil obtained by		Remarks.
		Chemical analysis.	Country Ghani.	
Paras ...	1,280	48·75	35·00	
Mota Paras ...	1,000	53·05	35·83	
Purple Stemmed ...	1,132	50·75	35·83	
Dharwar A ...	1,040	52·10	36·46	
Moti Chani ...	1,132	49·35	37·50	
Chani ...	880	51·00	38·54	
Brisbane ...	770	50·40	32·50	
Awnless ...	840	51·45	34·58	Rejected.
Madras ...	540	47·60	......	„
Dohad A ...	460	50·15	......	„
Dindori ...	760	48·90	32·50	„

Selection.

29. The following table shows the results of selection work done during the year on castors. To prevent cross fertilization the inflorescences were bagged by a thin muslin cloth but they failed to fertilize. A few seeds obtained will be sown next year :—

Name of the variety.	Number of plants selected in,		Average Yield of the ordinary row sown on two sides.		Yield of the selected row.		Ratio of the average of the ordinary row to the selected row.	Plant selected in 1913-14.	Seed obtained in Tolas.	Remarks.
	1911-12.	1912-13.	Lbs.	oz.	Lbs.	oz.				
Paras ...	1	1	4	8	3	4	0·7	P 1	4⅛	
	”	2	”		10	8	2·3	P 1 P 2	5 8	
	2	1	”		3	0	0·7	Nil.		
	”	2	”		7	0	1·5	Nil.		
Purple Stemmed.	1	1	3	7	4	4	1·2	Nil.		
	”	2	”		2	0	0·6	Nil.		
	”	3	”		3	0	0·9	P 1	1⅝	
	”	4	”		2	12	0·8	P 1	8¼	
Dharwar A, white.	1	1	5	4	3	12	0·7	P 1	6¼	
	”	2	”		1	12	0·3	P 1	3⅛	
	”	3	”		2	8	0·5	P 1	2¼	
	”	4	”		0	8	0·1	P 1	6¾	
	”	5	”		3	12	0·7	P 1	13	
Moti Chani ...	1	1	0	15	1	12	1·9	P 1	1¼	
	”	2	”		0	8	0·5			Failed.
	”	3	”		0	8	0·5			”
Madras Purple ...			0	5						”
Awnless ...			0	2						
Dohad A ...			0	6						

Til.

30. The varieties sown for selection work completely failed on account of the attack of Top shoot roller (Antigastra catalaunalis) which did not allow the formation of capsules.

PULSES.

Tur.

31. Seeds of covered flowers obtained last year were sown during the current year. Germination was uneven and the struggling plants were destroyed by Katras.

Fresh seeds of Bangalore, Sambalpore and Bilaspur tur varieties were obtained during the year and sown along with the local types. The seeds of the latter two varieties were very small. The germination of the introduced varieties was not satisfactory and the growth was stunted. The pods of Bangalore were large and the grains big sized. The other two new varieties bore very small pods and seeds.

Guvar.

1. Sotia local.
2. Do. Surat.
3. Rozi.
4. Sotia of gardens.
5. Pardeshi of Virsad.
6. Makhania of Surat.

32. The varieties of Guvar noted in the margin were grown for comparative yields in one guntha plots. The germination of all the varieties was good except that of Sotia of garden.

Sotia local and Sotia Surat are just similar varieties. Rozi and Sotia of garden are also one and the same and have the same colour. Pardeshi of Virsad and Makhania of Surat are both vegetable varieties. The pods are longer, without fibre and larger than the local field types. Pardeshi plants have a slaty green colour while Makhania has oily or grassy green colour. The latter is a late variety and remains in the field for longer period. It is more like Telia variety grown in the Kaira district. The results of these varieties are tabulated below. Sotia of garden and Sotia of Surat will be discontinued :—

Seiral. No.	Name of variety.	Yield in lbs. per acre.	Remarks.
1	Sotia local ...	940	
2	Sotia Surat ...	1,420	
3	Rozi ...	360	
4	Makhania (Surat) ...	800	
5	Pardeshi Virsad ...	730	
6	Sotia of Garden ...	60	

33. Wankadia, Telia and Dhulia local were also tried. They are vegetable varieties and appear to be very poor yielders when compared with Pardeshi and Makhania referred to above and therefore they will be rejected.

New crops—Soy beans.

34. Itosan and Cope—two varieties of soy beans mentioned in para. 51 of the last year's report were grown. The germination of both the varieties was good but they were completely destroyed by Katras. They were again sown on the 5th of August but did not germinate properly.

Asclepius phytocarpus.

35 The seeds of an African fibre plant were received from the Assistant Economic Botanist for trial. None of the seeds germinated.

Onions.

36. Some seeds of onions were received from Oporto for trial They were sown in the nursery on 18th December 1913. The seedlings and growth of plants were not so vigorous when compared with the local type grown side by side. They were transplanted in the field on 10th February 1914 when 54 days old. The beds were regularly irrigated but the bulbs did not form at all.

Fodder Experiments.

37. The object of starting the experiment is to observe and find out which fodders can be profitably raised in case of drought conditions with the following three main points in view :—

(1) Rapidity of yielding ;

(2) Quantity of outturn per unit of area ; and

(3 Cost of production.

To the last year's crops of Sundhia, cheno, kang and lucerne, the two others, *viz.*, maize and banti were added. The fodders were sown by the middle of every month throughout the year commencing from August, when it is likely that the drought conditions might begin to be felt by the cultivators.

The results of cereal fodder crops are summarized below. Each crop occupied one guntha in area :—

Date of sowing.	No. of irrigation given.	Yield per acre in lbs.		Period of growth in days.	Cost of production per acre in Rs.	Cost of production in lbs. per Rupee (dry).	Remarks.
		Dry.	Green.				
Maize.							
2nd August 1913 ...	Nil.	2,560	4,400	55	23·9	107	
15th September „ ...	5	3,960	6,720	64	53.3	74	
16th October „ ...	5	5,760	17,200	63	47·8	120·5	
15th November „ ...	5	4,800	13,200	74	47·8	100·5	
15th December „ ...	3	4,960	10,200	50	40·3	123	
15th January 1914 ...	7	2,240	5,000	78	62·5	36	Much damaged by borers and rats.
15th February „ ...	8	1,600	3,600	67	72·0	22	
15th March „ ...	5	2,800	6,000	57	51·1	55	
16th April „ ...	5	1,000	2,200	46	51·6	19	
Average ...		3,298	7,613	61·5	50	73	

N. B.—The outturn figures of all fodders are comparatively low.

Date of sowing.	No. of irrigation given.	Yield per acre in lbs.		Period of growth in days.	Cost of production per acre in Rs.	Cost of production in lbs. per Rupee (dry).	Remarks.
		Dry.	Green.				
Sundhia.							
22nd August 1913 ...	Nil.	6,760	13,720	55	27·7	244	
15th September „ ...	5	3,880	9,560	55	57·0	68	
16th October „ ...	5	4,400	9,880	64	51·0	86	
15th November „ ...	5	2,000	6,800	74	51·5	39	Much damaged by borers and rats.
15th December „ ...			Failed.				
15th January 1914 ...	7	2,000	4,600	84	66·2	30	
15th February „ ...	8	800	2,120	61	75·8	10	
15th March „ ...	5	6,600	13,840	57	54·9	120	
15th April „ ...	5	4,800	10,480	47	55·4	89	
Average ...		3,905	9,000	62	54·9	86	
Kang.							
22nd August 1913 ...	Nil.	1,840	3,200	55	23	80	
15th September „ ...	5	2,880	7,880	55	52·4	55	
16th October „ ...	5	4,400	12,200	63	46·3	95	
15th November „ ...	5	4,800	16,600	74	46·9	102	
15th December „ ...	6	2,880	6,000	80	56·8	51	
15th January 1914 ...	6	4,400	9,000	70	55·7	80	
15th February „ ...	8	4,000	8,520	63	71·1	56	
15th March „ ...	5	5,600	12,000	53	50·2	111·5	
15th April „ ...	5	4,400	9,400	39	50·7	87	
Average ...		3,911	9,422	61·3	50·3	80	
Cheno.							
22nd August 1913 ...	1	200	360	55	35	6	
15th September „ ...	3	1,040	4,400	43	40·2	26	
16th October „ ...	4	1,600	6,400	50	40·8	39	
15th November „ ...	4	400	2,440	51	40·8	10	
15th December „ ...			Failed.				

N. B.—The outturn figures of all fodders are comparatively low.

Date of sowing.	No. of irrigation given.	Yield per acre in lbs.		Period of growth in days.	Cost of production per acre in Rs.	Cost of production in lbs. per Rupee (dry).	Remarks.
		Dry.	Green.				
Cheno—contd.							
15th January 1914 ...	6	1,680	7,240	69	55·7	30	
15th February ,, ...	8	1,600	4,800	58	71·2	22	
15th March ,, ...	5	2,200	9,200	46	50·2	44	
15th April ,, ...	4	1,520	7,440	34	44·7	34	
Average ...		1,280	5,285	51	47·3	26·4	
Banti.							
22nd August 1913 ...	1	100	240	55	35	3	
15th September ,, ...	5	2,400	5,080	54	51·9	46	
16th October ,, ...	6	3,400	11,960	82	53·0	64	
15th November ,, ...	6	1,200	2,880	87	52·7	23	
15th December ,, ...	8	1,120	2,800	103	68·4	16	
15th January 1914 ...	6	640	1,400	72	55·7	11·5	
15th February ,, ...	10	4,800	10,000	89	83·2	58	
15th March ,, ...	6	7,000	14,520	63	56·2	124·5	
15th April ,, ...	5	3,200	6,800	47	50·7	63	
Average ...		2,984	6,187	72·4	58·5	45·5	

N. B.—The outturn figures of all fodders are comparatively low.

38. The following are the general observations made during the year :—

(1) The Sundhia is well worth growing little late in the monsoon and in the hot weather. Maize from August to December; Kang in October and November and in March. Banti has succeeded well in October and February to April.

(2) The growing period is two months in the case of Maize, Sundhia and Kang. Cheno takes nearly 6 weeks and Banti 10 weeks.

(3) By looking to the average production in lbs. per rupee it seems that Sundhia is the cheapest fodder to be raised, but in the cold weather when it does not grow well, it will be worthwhile to grow either Maize or Kang. Cheno would be the most costly fodder to be raised. Banti was observed to grow only 1½ foot high even in the month of March when it grew to its best on account of its spreading habit of growth.

39. During the year lucerne seed was sown on ridges 2′ apart. The seed when sown in the middle of August germinated well but the plants did not thrive and were observed to be dying away.

The sowings done in other months progressed well except that in the month of February which could give only two poor cuttings. When sown in the month of March and April the germinating plants parched up even though watered very often on account of hot weather. The results are tabulated below :—

Date of sowing.	No. of irrigations given.	Yield per acre in lbs. until 31st May.	No. of cuttings obtained.	Distribution of cuttings in days.	Cost of production in Rs. per acre.	Cost of production in lbs. (green) per Re.	Remarks.
Lucerne.							
22nd August 1913 ...	19	15,600	6	104, 47, 36, 29, 30, 35	188	83	
15th September „ ...	19	21,480	6	94, 42, 35, 27, 26, 32.	169·9	126·5	
16th October „ ...	16	18,000	5	81, 37, 35, 41, 31.	149·6	120·5	
15th November „ ...	15	18,840	5	98, 24, 19, 26, 26.	136·6	138	
15th December „ ...	13	11,360	4	94, 19, 27, 24.	128·3	89	
15th January 1914 ...	11	13,680	4	66, 24, 19, 23.	115·4	118·5	
15th February „ ...	11	1,280	2	75, 27 .	120·8	10·5	**Failed.**
15th March „ ...			Fail	ed.			
15th April „ .			Fail	ed.			

40. The observations made and referred to in paras. 55-57 are more or less confirmed this year.

SECTION II.—MANURIAL EXPERIMENTS.

Experiment No. 1.

[Reported under 2, last year].

41. This experiment as described in paragraphs 60 and 61 of the last year's report was continued during the year.

The san for green manuring was sown as usual. It was plouged in when $3\frac{1}{2}$ feet high in the last week of July. The growth of san was more uneven in the continuous tobacco growing plots than in the rotation plots. It was damaged by Katras to a certain extent.

42. Tobacco planting was over by the end of August. Many seedlings were attacked by stem borers. Gaps were filled up from time to time. With all this care the plots remained unhealthy and patchy resulting in poor outturns. Tobacco crop in the District seems to have fared the same fate during the year.

The results of tobacco crop grown continuously and manured with san manure are tabulated below :—

Plot No.	Manure. Kind.	Manure. Quantity in lbs. per acre.	Outturn per acre in lbs of cured leaf.	Value of produce per acre.	Cost of production per acre.	Cost of manure per acre.	Remarks.
				Rs. a. p.	Rs. a. p.	Rs. a. p.	
	Original.						
23-A	G. M. of San + K_2SO_4 + Super Phosphate.	19,800 + 200 + 300	804	62 13 0	102 14 0	45 2 2	
23-B	G. M. of San ...	19,500	708	55 5 0	66 0 8	9 11 2	
23-C	G. M. of San + K_2SO_4.	18,400 + 200	636	49 11 0	83 10 0	26 6 2	
	Duplicate.						
34-A	G. M. of San + K_2SO_4 + Super Phosphate.	18,240 + 200 + 300	864	67 8 0	102 14 0	45 2 2	
34-B	G. M. of San ...	17,970	780	60 15 0	66 0 8	9 11 2	
34-C	G. M. of San + K_2SO_4.	17,550 + 200	528	53 4 0	83 10 0	26 6 2	

43. The results obtained with the tobacco crop grown in rotation with Kodra mixture are as under :—

No. of plot.	Area in gunthas.	Crop.	Tillage.	Manure. Kind.	Manure. Quantity per acre in lbs.	Outturn of cured leaf in lbs. per acre.	Value of produce per acre.	Cost of production per acre.	Rotation to the Tobacco crop.	Remarks.
							Rs. a. p.	Rs. a. p.		
24	10	Tobacco ...	Deep ...	G. M. of San ...	21,120	976	76 4 0	66 0 8	Kodra Mixture.	
35	10	Do. ...	Do. ...	Do. ...	23,040	924	72 3 0	66 0 8	Do.	
26	10	Do. ...	Ordinary ...	F. Y. M. ...	30,000	1,108	86 9 0	92 6 2	Do.	
37	10	Do. ...	Deep ...	Do. ...	30,000	784	61 4 0	95 14 2	Do.	

44. The results of Kodra mixture in rotation are tabulated below :—

ORDINARY PLOUGHING.

Plot No.	Crop.	Yield per acre in lbs		Value of produce per acre.	Cost of cultivation per acre.	Remarks.
		Grain.	Fodder.			
				Rs. a. p.	Rs. a. p.	
25	Kodra ...	1,468	2,928	61 2 6	23 0 0	
	Tal ...	⅓	...			
	Tur ...	84	112			
	Sheria ...	220	96 (fibre).			
27	Kodra ...	1,904	4,216	100 13 8	23 0 0	
	Tal ...	1	...			
	Tur ...	440	520			
	Sheria ...	292	184 (fibre).			

DEEP PLOUGHING.

Plot No.	Crop.	Yield per acre in lbs.		Value of produce per acre.	Cost of cultivation per acre.	Remarks.
		Grain.	Fodder.			
				Rs. a. p.	Rs, a. p.	
36	Kodra ...	812	1,620	45 6 6	27 8 0	
	Tal ...	1	...			
	Tur ...	224	280			
	Sheria ...	168	72 (fibre).			
38	Kodra ...	1,016	2,248	62 3 6	27 8 0	
	Tal ...	1	...			
	Tur ...	484	616			
	Sheria ...	136	60 (fibre).			

45. Til plants were completely destroyed by Katras. The Kodra in plot No. 36 withered up in a patch of about 2 gunthas. The withered plants were sent to the Economic Botanist and Imperial Mycologist for identification. The former alludes this to physiological condition of the soil while the latter to some fungus disease—not yet worked out.

46. It will be seen from the statement above that the farmyard manure leaves a better residue than the green manure of San and that the deep tillage does not show any advantage over the ordinary one.

Experiment No. 2.

[Reported under 3, last year].

47. The object of this experiment is to test the relative value of three oil-cakes, *viz.*, castor, cotton-seed, and groundnut on tobacco crop. All the plots receive 20,000 lbs. of farmyard manure per acre before planting and when the seedlings are about 6″ to 8″ high they are topdressed at the rate of 1,000 lbs. per acre with these cakes. In these plots also, the tobacco crop suffered from stem borers to a certain extent. All the cakes have given increased outturns, the groundnut cake plot heading the list, but the additional cost of manure has not been covered over during the year under report. The results are tabulated below :—

No. of plot.	Special Manurial treatment. 1,000 lbs. per acre of	Special Manurial treatment. Cost per acre	Yield of cured leaf in lbs per acre.	Value of production per acre.	Cost of production per acre.	Net profit per acre.	Remarks.
		Rs. a. p.		Rs. a. p.	Rs a. p.	Rs. a. p.	
88-B	Nil ...	...	1,040	81 4 0	90 13 0	—9 9 0	
87-A	Castor-cake ...	25 0 0	1,576	123 2 0	118 10 4	+4 7 8	
88-A	Cotton-seed cake.	25 0 0	1,456	113 12 0	118 10 4	—4 14 4	
87-B	Groundnut cake.	33 5 4	1,600	125 0 0	126 15 8	—1 15 8	

48. This experiment is in progress since 1909-10. The average results are therefore drawn in a statement given below :—

Name of manure.	Quantity of manure per Acre in lbs.	Yield in lbs. in the year. 1909-10.	1910-11.	1912-13.	1913-14	Average yield of 4 years.
Farm yard manure ...	20,000	2,032	1,560	1,568	1,040	1,550
F. Y. M. and cotton-seed cake.	20,000 + 1,000	2,464	1,672	2,032	1,456	1,906
F. Y. M. and safflower cake.	20,000 + 1,000	2,378	1,784	...	...	2,081
F. Y. M. and groundnut cake.	20,000 + 1,000	...	...	2,256	1,600	1,928
F. Y. M. and castor cake...	20,000 + 1,000	2,344	1,824	2,696	1,576	2,110

From the above it will be seen that all the cakes increased the outturn from 20 to 36 per cent. over the check plot. The maximum increase being given by the top dressing of castor cake.

Experiment No. 3.

[Reported under 4, last year].

49. The general scheme has been fully described in paragraph 6 of the annual report for 1910-11.

In this experiment the tobacco crop was attacked by stem borers more seriously than in other tobacco plots and consequently the general appearance of the area was irregular and uneven. As the leaves of tobacco got mixed by blowing of cyclonic wind while sun drying, the results are vitiated and therefore not given.

Experiment No. 4.

[Reported under 5, last year].

50. The experiment with urine earth and cattle dung was continued during the year. The crop tested was Bajri in 10 guntha plots. They were manured with equal weights of urine earth and cattle dung (15,000 lbs. per acre). The crop in both the plots grew well but that in the plots treated with urine earth showed vigorous growth and deep green appearance throughout the growing period but at the time of flowering heavy showers of September washed the pollen and thus reduced the outturn.

The results are tabulated below :—

Plot Nos.		Kind of manure.	Yield in lbs. per acre.				Average total dry matter in lbs. per acre.
			Original.		Duplicate.		
Original.	Duplicate.		Grain.	Fodder.	Grain	Fodder.	
125-B	127-B	Urine earth ...	344	3,000	404	4,172	3,960
126-B	128-B	Cattle dung ...	288	2,476	228	2,652	2,822

Experiment No. 5.

51. In this experiment the paddy crop was topdressed with 80 lbs. nitre per acre when it was 12″ high. This manure was applied to both irrigated and rainfed paddy in addition to 20,000 lbs. of farmyard manure per acre already applied in May. The top dressing of nitre has resulted in one case in a profit of Rs. 8 per acre, while it only met its cost in the other. It was observed that the seedlings assumed deep green colour just a few days after the application of nitre. The results obtained are tabulated below :—

Plot Nos.	Manurial Treatment.	Crop.	Yield per acre in lbs.		Value of produce per acre.			Cost of production per acre.		
			Grain.	Fodder.	Rs.	a.	p.	Rs.	a.	p.
94	20,000 lbs. F. Y. M. + 80 lbs. Nitre.	Sutarsal Rice.	2,160	2,007	71	10	8	52	11	4
95	20,000 lbs. F. Y. M. ...	Do. ...	1,572	1,404	52	0	9	41	7	8
90	20,000 lbs. F. Y. M. + 80 lbs. Nitre.	Do. ...	2,233	2,053	74	1	1	52	11	4
91	20,000 lbs. F. Y. M. ...	Do. ...	1,880	1,787	62	7	7	41	7	8

Owing to sufficient rainfall in September the paddy crop in plots 94 and 95 was not irrigated.

After harvest of the paddy crop the beds were cropped with Dhola variety of wheat. The crop grew well but in the later stage it was very badly affected with rust and smut. The yield obtained was poor and hence not reported.

Experiment No. 6.

52. The experiment of making the soil suitable for potato cultivation by increasing the organic matter in the sandy soils by green manuring of san and farmyard manure was repeated during the year.

The germination of the tubers was slow and was rather uneven in the duplicates. On the whole the crop was healthy. The outturn results are fair and are tabulated below :—

Plot Nos.		Manurial Treatment.		Outturn of Potatoes per Acre in Lbs.			Remarks.
Originals.	Duplicates.	Kind.	Quantity per acre in lbs.	Original plots.	Duplicate plots.	Average.	
51-A	59-A	G. M. of San + K_2SO_4 + Super phosphate.	16,960 + 100 + 200	8,160	6,960	7,560	
51-B	59-B	F. Y. M. ...	20,000	7,520	6,840	7,180	

SECTION III.—CULTURAL EXPERIMENTS.

Experiment No. 1.

53. In this experiment the advantage or otherwise of a fair season cultivation for the ordinary Kharif crops is being investigated. The land was discploughed during April 1913 which stirred the soil to a depth of about 3″. The crops sown were Bajri mixture, Kodra mixture and Sundhia. Owing to heavy rains immediately after sowing, the seeds did not germinate and had to be resown. The first sown Tal and pulses were destroyed by Katras. The resowing of Bajri proved a failure, but pulses grew well and yielded fairly Sundhia germinated well but did not grow sufficiently high owing probably to heavy showers of rain during August and September. The results obtained being very poor are not given

Experiment No. 2.

[Reported under 4, last year.]

54. A trial to ascertain the most suitable number of seedlings to be transplanted in one place is in progress since 1909-10. The results obtained go to prove that planting 2 or 3 seedlings in one place is advantageous.

The rice beds are manured with 20,000 lbs. of farmyard manure per acre every year.

The results of the year are tabulated below :—

Number of seedlings at one place.	Yield per acre in lbs.		Value of produce per acre.	Cost of production per acre.
	Grain.	Straw.		
			Rs. a. p.	Rs. a. p.
One seedling ...	1,774	1,157	57 14 1	41 7 8
Two seedlings ...	2,256	1,286	73 8 4	
Three do. ...	2,069	1,067	66 14 1	

55. The average results obtained since 1909-10 are summarized below for ready reference :—

Number of seedlings.	1908-09.		1909-10.		1910-11.	
	Grain.	Straw.	Grain.	Straw.	Grain	Straw.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
One seedling ..	749	1,490	1,362	1,554	1,895	2,213
Two seedlings ...	1,365	2,708	1,991	2,223	2,030	2,357
Three do. ...	1,557	2,709	2,005	2,538	2,112	2,432

Number of seedlings.	1912-13.		1913-14.		Average.		Remarks.
	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	
One seedling ...	2,957	6,300	1,774	1,157	1,746½	2,543	
Two seedlings ...	2,933	6,521	2,256	1,286	2,115	3,021	
Three do. ...	2,987	6,570	2,069	1,067	2,146	3,063	

SECTION IV.—ROTATIONAL EXPERIMENTS.

Experiment No. 1.

56. This experiment was continued during the year under report. It consists of comparing the relative advantages of growing common crops of the district pure and in mixtures. The results obtained are tabulated on page 25 and they confirm the observations made in para. 73 of the last year's report.

Plot No.	Crop.	Crops grown pure.				Remarks.	Plot No.	Crop.	Crops grown mixed.				Remarks.
		Yield per acre in lbs.		Value of produce per acre.	Cost of production per acre.				Yield per acre in lbs.		Value of produce per acre.	Cost of production per acre.	
		Principal product.	Bye product.						Principal product.	Bye product.			
				Rs. a. p.	Rs. a. p.						Rs. a. p.	Rs. a. p.	
42	Bajri ...	8	200	19 14 0	36 5 1		31	Bajri ...	38	536	20 5 6	36 5 1	
	Math ...	144	764					Math ...	60	200			
	Mag ...	112	460					Mag ...	200	452			
	Tur ...	104	80					Tur ...	53	40			
43	Kodra ...	120	200	34 15 2	24 4 4		32	Kodra ...	568	1,016	56 5 4	24 4 4	
	Tal ...	32	...					Tal ...	1	...			
	Tur ...	396	392					Tur ...	772	568			
	Sheria ...	68	Fibre 32					Sheria ...	80	Fibre 24			
44	Bavto ...	180	472	34 2 10	27 13 10		33	Bavto ...	700	1,796	94 1 8	27 13 10	
	Castors ...	260	...					Castors ...	336	...			
	Wal ...	48	Green pods 542					Wal ...	71	Green pods 2,240			

57. Bajri and the subordinate pulses had to be resown owing to the former having been covered with sand by surface wash and the latter having been destroyed by Katras. In the Kodra mixture plot Tal yielded nothing. In all the plots the principal crop of the mixture when sown alone has yielded very much less than in the mixture proper.

Experiment No. 2.

58. In this experiment Bajri and Kodra mixtures grown continuously are compared with the same mixtures grown as a two year rotation.

The remarks regarding the growth germination and condition of the crops are the same as in experiment No. 1 above.

The results are tabulated below :—

Group of plots.	Rotation.	No. of plots.	Crops.	Yield per acre in lbs.		Value of produce per acre.	Cost of production per acre.
				Grain.	Fodder.		
						Rs. a. p.	Rs. a. p.
I	Continuous Bajri mixture.	137	Bajri ...	500	4,630	69 8 1	17 7 2
			Math ..	85	320		
			Mag ...	160	550		
			Tur ...	300	370		
II	Bajri mixture and Kodra mixture in rotation.	138	Kodra ...	510	950	45 9 11	22 10 9
			Tal ...	15	...		
			Tur ...	560	420		
			Sheria ...	80	Fibre 15		
		139	Bajri ...	68	1,384	27 10 4	17 7 4
			Math ..	40	240		
			Mag ...	112	376		
			Tur ...	228	224		
III	Continuous Kodra mixture.	140	Kodra ...	392	696	42 5 4	22 10 9
			Tal ...	...	...		
			Tur ...	600	504		
			Sheria ...	64	Fibre 16		

Miscellaneous.

59. According to G. R. No. 8241, dated the 20th August 1907, four plots were set aside to compare the yields of Bajri and Kodra mixture when treated according to local practice with those when the land is well manured.

The results are tabulated below :—

Plot No.	Treatment.	Crop.	Yield per acre in lbs.		Value of produce per acre.	Cost of production per acre.
			Grain.	Fodder.		
					Rs. a. p.	Rs. a. p.
123A	No manure ..	Kodra	517	939½	68 6 1	28 14 8
		Tal ..	40	...		
		Tur ...	894	715		
		Sheria ...	147½	Fibre 49		
*123B	Residue of last year's F. Y. M. 15,000 lbs. per acre.	Kodra ...	674	1,200	88 6 10	28 14 8
		Tal ...	68	...		
		Tur ...	1,148	1,032		
		Sheria ...	168	Fibre 50		
124A	No manure ..	Bajri ...	291	2,966	24 11 10	12 12 3
124B	Residue of last year's Farm Yard Manure 15,000 lbs. per acre.	Do. ...	372	2,664	30 13 10	12 12 3

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* Plots 123B—124B have been manured at the rate of 15,000 lbs. of Fram Yard Manure per acre every alternate year since 1908-09 commencing in that year.

Kodra had to be resown on account of unsatisfactory germination. Tur yielded well.

60. The following is the list of appendices to the report :—

I. Labour rates and prices of produce sold.
II. Analyses and prices (inclusive of freight) of manures used.
III. Prices of food-stuffs used.
IV. Average analysis of the water of the farm well used for irrigation purposes.
V. Quantities of irrigation water applied to various crops.
VI. Comparison of farm *versus* cultivators' crops (*vide* G. R. No. 8241, dated 20th August 1907).
VII. Statement showing the distribution of seeds, implements and manures.
VIII. Statement of enquiries received.
IX. List of visitors.
X. Statement of selection work conducted on wheat.
XI. Statement for highest numbers of culms (tillering) per plant.
XII. Note on the agricultural deterioration and the condition of the agricultural population (as per G. R. No. 85, dated 5th January 1907, R. D.).

APPENDIX I.

Labour rates and prices of produce sold.

Name.	Rate.	Per
Labour.	Rs. a. p.	
Male ...	0 4 0	head.
Female ...	0 2 6	„
Boy ...	0 1 6	„
Bullock ...	0 6 0	„
Carpenter ...	1 0 0	„
Mason ...	0 12 0	„
Farm produce.		
Grain—		
Bajri ...	2 0 0	40 lbs.
Sundhia ...	2 8 0	„
Kodra ...	1 0 0	„
Rice ...	1 4 0	„
Bavto ...	1 8 0	„
Cotton ...	3 12 0	„
Wheat ...	2 0 0	„
Castors ...	2 4 0	„
Tobacco ...	3 2 0	„
Fooder—		
Jowar ...	1 0 0	100 lbs.
Bajri ...	1 0 0	300 lbs.
Kodra ...	1 0 0	500 lbs.

APPENDIX II.

Analyses and prices (inclusive of freight) of manures used.

Name of manure.	Nitrogen.	Potash.	Phosphoric acid.	Rate per Rupee in lbs.	Remarks.
Castor cake ...	3·91	1·61	1·74	40	
Groundnut cake ...	7·53	1·65	1·64	30	
Cotton-seed cake ...	4·92	2·25	2·48	40	
Farm Yard manure ...	0·52	1·32	0·80	1,000	
Wood-ashes ...	0·05	5·22	2·70	800	
Urine earth ...	0·17	...	0·19	1,000	
Superphosphate ...	...	...	13·52	16	
Sodium nitrate ...	16·24	...	...	7¼	97·57 % purity.
Nitre ...	13·33	44·74	...	7¼	96·14 % „
Potassium sulphate ...	...	42·90	...	12	76·38 % „

APPENDIX III.

Prices of food-stuffs used.

Name.	Rate.			Per
	Maximum.	Minimum.	Average.	
				Lbs.
Guvar ...	1 9 0	1 5 6	1 7 3	40
Sundhia fodder ...	1 0 0	1 0 0	1 0 0	100
Bajri „ ...	1 0 0	1 0 0	1 0 0	150
Lucerne ...	1 0 0	1 0 0	1 0 0	100

APPENDIX IV.

Average analysis of the Water of the Farm well used for irrigational purposes.

Name of salt.	Parts per 100,000.	Remarks.
Calcium carbonate ...	11·41	
Magnesium carbonate ...	24·14	
Do. sulphate ...	11·76	
Do. chloride ...	16·69	
Sodium bicarbonate ...	12·95	
Do. sulphate ...	12·70	
Do. carbonate ...	7·77	
Do. chloride ...	62·47	

APPENDIX V.

Quantities of irrigation water applied to various crops.

Crop.	Quantity of water at the time of sowing in c. ft.	Quantity of water at the time of 1st watering in c. ft.	Quantity of water at the time of 2nd watering in c. ft.	Total No. of waterings.	Total quantity of water applied.		Rainfall during the period in inches.	Total quantity of water in inches.
					In c. ft.	In inches.		
Tobacco ...	Nil.	7,269·16	5,524·56	3	18,172·90	5·05	9·32	14·37
Wheat ...	10,359·60	6,422·95	6,733·74	5	35,067·24	9·74	Nil.	9·74
Potatoes ...	9,595·28	7,882·96	8,723·00	7	59,152·92	16·43	Nil.	16·43

APPENDIX VI.

Statement showing comparison between Farm and cultivator's crops during the year 1913-14 (vide G. R. No. 8241, dated 20th August 1907).

Name of place.	Crop.	Yield per acre in lbs.		Remarks.
		Farm.	Cultivators.	
	Kodra mixture.			
Farm *vs.* Kamla village.	Kodra grain ...	517	461¼	
	Do. fodder ...	939½	730	
	Til ...	40	133½	
	Tuer ...	894	394¾	
	Sheria (fibre) ...	49	10	
	Do. grain ...	147½	20½	
	Castors ...	...	25½	
	Bajri mixture.			
Do.	Bajri grain ...	500	431	Average results of two tests shown.
	Do. fodder ...	4,630	3,283	
	Mag ...	160	...	
	Math ...	85	...	
	Tuer ...	300	266	
	Guvar ...	...	78	
Farm *vs.* Manjipura village.	Sundhia—grain ...	62	184¾	
	Do. fodder ...	1,350	3,010	
	Math ...	...	333¼	

APPENDIX VII.

Statement showing the distribution of seeds, implements and manures.

Name of seed.	Quantity in lbs.	Name.	Number.
Seeds.		*Implements.*	
Bajri ...	67	Monsoon ploughs ...	10
Awned Bajri ...	25	Do. shares ...	3
Bajro ...	10	Do. share points ...	14
Sundhia Jowar ...	2220½	B. T. 2 ploughs ...	10
Millets ...	2½	Do. shares ...	23
Wheat (popatia) ...	120	C. T.2 ploughs ...	1
Kamod rice ...	40	Do. shares ...	5
Wanklo rice ...	16	A. T.2 plough ...	1
Tur ...	31	Arlington plough No. 30 ...	6
Wal ...	28	Bucco-hand cultivators ...	6
Castors ...	381	Planet junior hand hoes ...	4
Guvar varieties ...	12	*Manures.*	
Cambodia Cotton seed ...	520	Ammonium sulphate ...	156 lbs.
Lalio ,, ,, ...	641	Castor cake ...	340 lbs.
Buri ,, ,, ...	5		
Bourbon ,, ,, ...	11		
Sheria ...	16		
Sisal bulbils ...	400 (plants)		
Chilles ...	1		
Variali ...	3		
Jiru ...	20		
Groundnut ...	20		
Tobacco seed ...	4		

APPENDIX VIII.

Statement of enquiries received.

Enquiries regarding the cultivation of Cambodia cotton, tobacco, safflower, Sundhia, fruit culture, remedial measures for white-ants, mango diseases, working of iron ploughs and other various implements and manures were received and were duly answered.

APPENDIX IX.

List of visitors.

	Cultivators.	Government Servants.	Others.	Total.
From 1st April to June 30, 1913 ...	234	6	14	254
From 1st July to September 30, 1913 ...	58	4	7	69
From 1st October to December 31, 1913 ...	20	...	9	29
From 1st January to March 31, 1914 ...	11	...	...	11
Total ...	323	10	30	363

APPENDIX X.

Statement of selection work conducted on wheat for highest number of Spikelets per spike.

Name of Variety.	Selections made in							
	1910-11.		1911-12.		1912-13.		1913-14.	
	Serial No. of plant.	No. of Spikelets per ear head.	Serial No. of plant.	No. of spikelets per ear head.	Serial No. of plant.	No. of Spikelets per ear head.	Serial No. of plant.	No. of Spikelets per ear head.
Dhola ...	1 (1)	12	1	16	1	12	1	18–18
			1	16	1	12	2	19–18
			1	16	2	15	1	19–18
			1	16	2	15	2	18–18
			2	14	1	14	1	18–18
			2	14	1	14	2	18–18
			2	14	2	14	1	18–18
			2	14	2	14	2	18–18
			2	14	2	14	3	19–18
			3	13	1	13	1	18–18
			3	13	1	13	2	18–18
			3	13	2	14	1	17–16
			3	13	2	14	2	18–18
	1 (2)	12	1 (1)	16	1	16	1	18–17
			1 (1)	16	1	16	2	16–16
			1 (1)	16	2	16	1	16–16
			1 (1)	16	2	16	2	18–17
			1 (2)	16	1	12	1	19–18
			1 (2)	16	1	12	2	18–18
			1 (2)	16	2	14	1	18–18
			1 (2)	16	2	14	2	17–16
			1 (2)	16	3	13	1	18–17
			1 (2)	16	3	13	2	18–17
			1 (3)	16	1	13	1	17–16

APPENDIX X—*continued.*

Name of Variety.	Selections made in							
	1910-1911.		1911-12.		1912-13.		1913-14.	
	Serial No. of plant.	No of Spikelets per ear head.	Serial No. of Plant.	No. of Spikelets per ear head.	Serial No. of plant.	No. of Spikelets per ear head.	Serial No. of plant.	No. of Spikelets per ear head.
			1 (3)	16	1	13	2	17–16
			1 (3)	16	2	13	1	18–16
			1 (3)	16	2	13	2	18–17
	1 (2)	12	1 (4)	16	1	16	1	17–17
			1 (4)	16	1	16	2	18–16
			1 (4)	16	2	17	1	17–17
			1 (4)	16	2	17	2	19–16
			2	14	1	16	1	19–18
			2	14	1	16	2	18–18
			2	14	2	17	1	18–17
			2	14	2	17	2	17–17
	1 (3)	12	1 (1)	15	1	17	...	...
			1 (1)	15	2	16	1	18–16
			1 (1)	15	2	16	2	18–16
			1 (1)	15	3	16	1	18–17
			1 (1)	15	3	16	2	17–16
			1 (2)	15	1	14	1	16–16
			1 (2)	15	2	15	1	17–16
			1 (2)	15	2	15	2	18–16
			1 (3)	15	1	15	1	18–18
			1 (3)	15	1	15	2	19–18
			1 (3)	15	2	16	1	19–18
			1 (3)	15	2	16	2	18–18
			1 (3)	15	3	16	1	17–15
			1 (3)	15	3	16	2	18–17
			1 (4)	15	1	17	1	19–18

APPENDIX X—*continued.*

Name of Variety.	Selections made in							
	1910-11.		1911-12.		1912-13.		1013-14.	
	Serial No. of plant.	No. of Spikelets per ear head.	Serial No. of plant.	No. of Spikelets per ear head.	Serial No. of plant.	No. of Spikelets per ear head.	Serial No. of plant.	No. of Spikelets per ear head.
			1 (4)	15	1	17	2	19–18
			1 (4)	15	2	17	1	19–18
			1 (4)	15	2	17	2	18–18
			1 (4)	15	3	17	1	19–19
			1 (4)	15	3	17	2	19–19
	1 (3)	12	2 (1)	14	...	...	...	...
			2 (2)	14	1	17	...	...
			2 (2)	14	2	17	1	19–18
			2 (2)	14	2	17	2	18–18
			2 (2)	14	3	15	1	19–18
			2 (2)	14	3	15	2	20–18
	1 (4)	12	1	15	1	15	1	18–18
			1	15	1	15	2	18–18
			1	15	2	15	1	18–18
			1	15	2	15	2	18–18
			1	15	3	16	1	19–18
			1	15	3	16	2	19–18
			2 (1)	14	1	17	1	19–18
			2 (1)	14	1	17	2	18–18
			2 (1)	14	2	17	1	19–19
			2 (1)	14	2	17	2	19–19
			2 (2)	14	1	15	1	19–18
			2 (2)	14	1	15	2	19–18
			2 (2)	14	2	16	1	19–18
			2 (2)	14	2	16	2	19–18
			2 (3)	14	1	16	1	19–17

APPENDIX X—*continued.*

Name of Variety.	Selections made in							
	1910-1911.		1911-12.		1912-13.		1913-14.	
	Serial No. of plant.	No. of Spikelets per ear head.	Serial No. of plant.	No. of Spikelets per ear head.	Serial No. of plant.	No. of Spikelets per ear head.	Serial No. of plant.	No. of Spikelets per ear head.
			2 (3)	14	1	16	2	18–17
			2 (3)	14	2	15	1	19–19
			2 (3)	14	2	15	2	18–18
	1 (5)	12	1	14	1	14	1	19–18
			1	14	1	14	2	18–18
Popatia ...	4	21	1 (1)	30	1	25	1	31–31
			1 (1)	30	1	25	2	30–30
			1 (1)	30	2	25	1	30–30
			1 (1)	30	2	25	2	30–29
			1 (2)	30	1	27	1	29–28
			1 (2)	30	1	27	2	29–28
			1 (2)	30	2	25	1	32–32
			1 (2)	30	2	25	2	31–30
			2	29	...	...	...	...
	5	21	1 (1)	29	1	28	1	31–30
			1 (1)	29	1	28	2	30–29
			1 (1)	29	2	28	1	30–30
			1 (1)	29	2	28	2	30–29
			1 (2)	29	1	29	1	31–30
			1 (2)	29	1	29	2	32–30
			1 (2)	29	2	27	1	32–31
			1 (2)	29	2	27	2	28–28
			1 (3)	29	1	26	1	30–29
			1 (3)	29	1	26	2	30–28
			1 (3)	29	2	25	1	32–31
			1 (3)	29	2	25	2	31–29

APPENDIX X—*continued.*

Name of Variety.	Selections made in							
	1910-11.		1911-12.		1912-13.		1913-14.	
	Serial No. of plant.	No. of Spikelets per ear head.	Serial No. of plant.	No. of Spikelets per ear head.	Serial No. of plant.	No. of spikelets per ear head.	Serial No. of plant.	No. of Spikelets per ear head.
	10	21	1	31	1	32	1	32–30
			1	31	1	32	2	30–30
			1	31	2	30	1	30–30
			1	31	2	30	2	30–29
	12	21	1 (1)	...	...	...	...	...
			1 (2)	29	1	28	1	31–31
			1 (2)	29	1	28	2	31–30
	12	21	1 (2)	29	2	27	1	30–30
			1 (2)	29	2	27	2	30–29
			1 (3)	29	1	27	1	32–31
			1 (3)	29	1	27	2	31–31
			1 (3)	29	2	24	1	31–30
			1 (3)	29	2	24	2	30–29
...	... 27	... 21	... 1	30	1	29	1	30–29
			1	30	1	29	2	30–29
			1	30	2	28	1	31–29
			1	30	2	28	2	30–30
			2 (1)	28	1	27	1	29–28
			2 (1)	28	1	27	2	29–29
			2 (1)	28	2	28	1	31–31
			2 (1)	28	2	28	2	30–28
			2 (2)	28	1	26	1	30–29
			2 (2)	28	1	26	2	30–28
			2 (2)	28	2	27	1	28–28
			2 (2)	28	2	27	2	29–29
			2 (3)	28	1	27	1	32–30

APPENDIX X—*continued.*

Name of Variety.	Selections made in							
	1910-11.		1911-12.		1912-13.		1913-14.	
	Serial No. of plant.	No. of Spikelets per ear head.	Serial No. of plant.	No. of Spikelets per ear head.	Serial No of plant.	No. of Spikelets per ear head.	Serial No. of plant.	No. of Spikelets per ear head.
	29	21	2 (3)	28	1	27	2	30–29
			2 (3)	28	2	25	1	32–30
			2 (3)	28	2	25	2	31–31
			2 (4)	28	1	29	1	30–29
			2 (4)	28	1	29	2	30–29
			2 (4)	28	2	27	1	29–29
			2 (4)	28	2	27	2	29–29
			1	30	1	27	1	30–29
			1	30	1	27	2	29–29
			1	30	2	26	1	32–32
			1	30	2	26	2	32–31
			2 (1)	28	1	28	1	30–29
			2 (1)	28	1	28	2	29–28
			2 (1)	28	2	24	1	32–31
			2 (1)	28	2	24	2	31–29
			2 (2)	28	1	28	1	30–30
			2 (2)	28	1	28	2	31–28
			2 (2)	28	2	25	1	29–28
			2 (2)	28	2	25	2	29–28
			2 (3)	28	1	27	1	32–31
			2 (3)	28	1	27	2	32–31
			2 (3)	28	2	28	1	30–30
			2 (3)	28	2	28	2	29
			2 (4)	28	1	27	1	32–31
			2 (4)	28	1	27	2	30–28
			2 (4)	28	2	29	1	32–30
			2 (4)	28	2	29	2	31–31

Note. In column 9 two figures are given. This means that a second ear head as a reserve has been kept but it will not be sown unless the seed of the first one is lost. The figures in brackets in columns 2 and 4 refer to ear heads while the figures not in brackets refer to distinct plants.

APPENDIX XI.

Selection for highest number of culms (tillers) per plant.

Variety.	1911-12 selection.			1912-13 selection.			1913-14 selection.			Remarks.
	Serial number of plant.	Number of tillers.	Serial number of earheads.	Plant number selected.	Number of tillers.	Number of earheads kept.	Plant number selected.	Number of tillers.	Number of earheads kept.	
Dhola ...	1	11	1	1	7	5	1	13	5	
	...	...	...	...	...	...	2	12	5	
	...	...	...	2	8	5	1	12	5	
	...	...	...	...	...	...	2	11	5	
	1	11	2	1	11	5	1	11	5	
	...	...	...	...	...	...	2	10	5	
	...	...	...	2	10	5	1	9	5	
	...	...	...	...	...	...	2	7	5	
	1	11	3	1	12	5	1	18	5	
	...	...	...	...	...	...	2	14	5	
	...	...	...	2	11	5	1	14	5	
	...	...	...	...	...	...	2	13	5	
	1	11	4	1	12	5	1	12	5	
	...	...	...	...	...	...	2	11	5	
	1	11	5	1	16	5	1	12	5	
	...	...	...	...	...	...	2	11	5	
	...	...	...	2	22	5	1	24	5	
	...	...	...	...	...	...	2	19	5	
Popatia ...	1	34	1	1	37	5	1	17	5	
	...	...	...	...	...	...	2	15	5	
	1	34	1	2	38	5	1	28	5	
	...	...	...	...	...	...	2	19	5	
	1	34	2	...	...	...	...	...	...	
	1	34	3	1	20	5	1	16	5	
	...	...	...	...	...	...	2	15	5	

APPENDIX XI—*continued.*

Variety.	1911-12 selection.			1912-13 selection.			1913-14 selection.			Remarks.
	Serial number of plant.	Number of tillers.	Serial number of earheads.	Plant number selected.	Number of tillers.	Number of earheads kept.	Plant number selected.	Number of tillers.	Number of earheads kept.	
Popatia—*continued.*	1	34	3	2	20	5	1	15	5	
	...	...	...	...	...	...	2	14	5	
	1	34	4	1	17	5	1	35	5	
	...	...	...	...	...	...	2	27	5	
	...	...	...	2	24	5	1	27	5	
	...	...	...	...	...	...	2	24	5	
	1	34	5	1	28	5	1	37	5	
	...	...	...	...	...	...	2	31	5	
	...	...	...	2	27	5	1	25	5	
	...	...	...	...	...	...	2	23	5	
	1	34	6	1	17	5	1	28	5	
	...	...	...	...	...	...	2	15	5	
	...	...	...	2	20	5	1	26	5	
	...	...	...	...	...	...	2	22	5	
	1	34	7	1	32	5	1	27	5	
	...	...	...	...	...	...	2	19	5	
	...	...	...	2	30	5	1	24	5	
	...	...	...	...	...	...	2	18	5	
	1	34	8	1	22	5	1	29	5	
	...	...	...	...	...	...	2	27	5	
	...	...	...	2	17	5	1	33	5	
	...	...	...	...	...	...	2	25	5	
	1	34	9	1	30	5	1	31	5	
	...	...	...	...	...	...	2	29	5	
	...	...	...	2	25	5	1	28	5	
	...	...	...	...	...	...	2	18	5	
	1	34	10	1	17	5	1	43	5	

APPENDIX XI.—*continued.*

Variety.	1911-12 selection.			1912-13 selection.			1913-14 selection.			Remarks.
	Serial number of plant.	Number of tillers.	Serial number of earheads.	Plant number selected.	Number of tillers.	Number of earheads kept.	Plant number selected.	Number of tillers.	Number of earheads kept.	
Popatia—*continued.*	...	...	...	...	...	...	2	21	5	
	1	34	10	2	23	5	1	33	5	
	...	...	...	...	...	...	2	28	5	
	2	38	1	1	31	5	1	28	5	
	...	...	...	...	...	...	2	25	5	
	...	...	...	2	23	5	1	16	5	
	2	38	1	...	...	...	2	15	5	
	2	38	2	1	52	5	1	19	5	
	...	...	...	...	...	...	2	15	5	
	...	...	...	2	38	5	1	27	5	
	...	...	...	...	...	...	2	18	5	
	2	38	3	1	23	5	1	41	5	
	...	...	...	...	...	...	2	33	5	
	...	...	...	2	24	5	1	34	5	
	...	...	...	...	...	...	2	26	5	
	2	38	4	1	8	5	1	21	5	
	...	...	...	...	...	...	2	15	5	
	2	38	5	1	13	5	1	19	5	
	...	...	...	...	...	...	2	15	5	
	...	...	...	2	6	5	1	34	5	
	...	...	...	...	...	...	2	26	5	
	2	38	6	1	30	5	1	27	5	
	...	...	...	...	...	...	2	23	5	
	...	...	...	2	25	5	1	19	5	
	...	...	...	...	...	...	2	21	6	
	2	38	7	1	20	5	1	24	5	
	...	...	...	...	...	...	2	22	5	

APPENDIX XI—*continued.*

Variety.	1911-12 selection.			1912-13 selection.			1913-14 selection.			Remarks.
	Serial number of plant.	Number of tillers.	Serial number of earheads.	Plant number selected.	Number of tillers.	Number of earheads kept.	Plant number selected.	Number of tillers.	Number of earheads kept.	
Popatia—*continued.*	...	...	...	2	28	5	1	39	5	
	...	...	...	...	...	...	2	38	5	
	2	38	8	1	15	5	1	23	5	
	...	...	...	...	...	...	2	19	5	
	...	...	...	2	22	5	1	47	5	
	...	...	...	...	...	...	2	39	5	
	2	38	9	1	23	5	1	27	5	
	...	...	...	...	...	...	2	25	5	
	...	...	...	2	21	5	1	31	5	
	...	...	...	...	...	...	2	27	5	
	2	38	10	1	16	5	1	34	5	
	...	...	...	...	...	...	2	15	5	
	...	...	...	2	19	5	1	29	5	
	...	...	...	...	...	...	2	24	5	
	...	...	...	1	26	5	1	43	5	
	...	...	...	...	...	...	2	23	5	
	...	...	...	2	15	5	1	21	5	
	...	...	...	...	...	...	2	19	5	
	...	...	...	3	21	5	1	36	5	
	...	...	...	...	...	...	2	17	5	
	...	...	...	4	19	5	1	30	5	
	...	...	...	...	...	...	2	19	5	
	...	...	...	5	16	5	1	31	5	
	...	...	...	...	...	...	2	29	5	
	...	...	...	6	26	5	1	27	5	
	...	...	...	...	...	...	2	25	5	
	...	...	...	7	41	5	1	20	5	

APPENDIX XI—*continued.*

Variety.	1911-12 selection.			191 -13 selection.			1913-14 selection.			Remarks.
	Serial number of plant.	Number of tillers.	Serial number of earheads.	Plant number selected.	Number of tillers.	Number of earheads kept.	Plant number selected.	Number of tillers	Number of earheads kept.	
Popatia—*continued.*	...	...	...	...	...	...	2	16	5	
	...	...	...	8	31	5	1	23	5	
	...	...	...	...	...	...	2	22	5	
	...	...	...	9	25	5	1	49	5	
	...	...	...	...	...	...	2	40	5	

APPENDIX XII.

Note on Agricultural Deterioration and the condition of the agricultural population as per G. R. No. 85, dated 5th January 1907 R. D.

There is nothing to add to the remarks made in the preceeding years.

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W. Thacker & Co., 2, Creed Lane, London, E.C.
Luzao & Co., 46, Great Russel Street, London, W.C.
B. H. Blackwell, 50 & 51, Broad Street, Oxford.
Deighton Bell & Co., Ltd., Cambridge.

On the Continent of Europe.

Ernest Leroux, 28, Rue Bonaparte, Paris.
Martinus Nijhoff, The Hague, Holland.

In India

Higginbotham & Co., Madras.
V. Kalyanarama Iyar & Co., Madras.
P. R. Rama Iyer & Co., Madras.
Thacker, Spink & Co., Calcutta and Simla.
W. Newman & Co., Calcutta.
S. K. Lahiri & Co., Calcutta.
R. Cambray & Co., Calcutta.
Thacker & Co. Ltd., Bombay.
A. J. Combridge & Co., Bombay.
Manager, Government Central Press, Bombay.
D. B. Taraporevala, Sons & Co., Bombay.
Sunder Pandurang, Booksellers, &c., Bombay
Gopal Narayan & Co., Booksellers, &c., Bombay.
N. M. Tripathi & Co., Booksellers, &c., Bombay.
Mrs. Radhabai Atmaram Sagoon, Bookseller, &c., Bombay.
Ramchandra Govind & Son, Booksellers, &c., Bombay.
Bombay Tract & Book Society, Bombay.
N. B. Mathur, Nazir Kanun Hind Press, Allahabad.
Messrs. A. H. Wheeler & Co., Allahabad, Calcutta and Bombay.
Manager, Nyayashraya, Poona.
M. R. Ry. E. M. Gopalakrishna Kone, Madura

Department of Agriculture, Bombay.

ANNUAL REPORT

OF THE

EXPERIMENTAL WORK

OF THE

NADIAD AGRICULTURAL STATION

(Kaira District, Guzerat)

FOR THE YEAR

1914-15

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BY

T. FORSTER MAIN, B.Sc.,
Deputy Director of Agriculture, N. D. Poona.

POONA;
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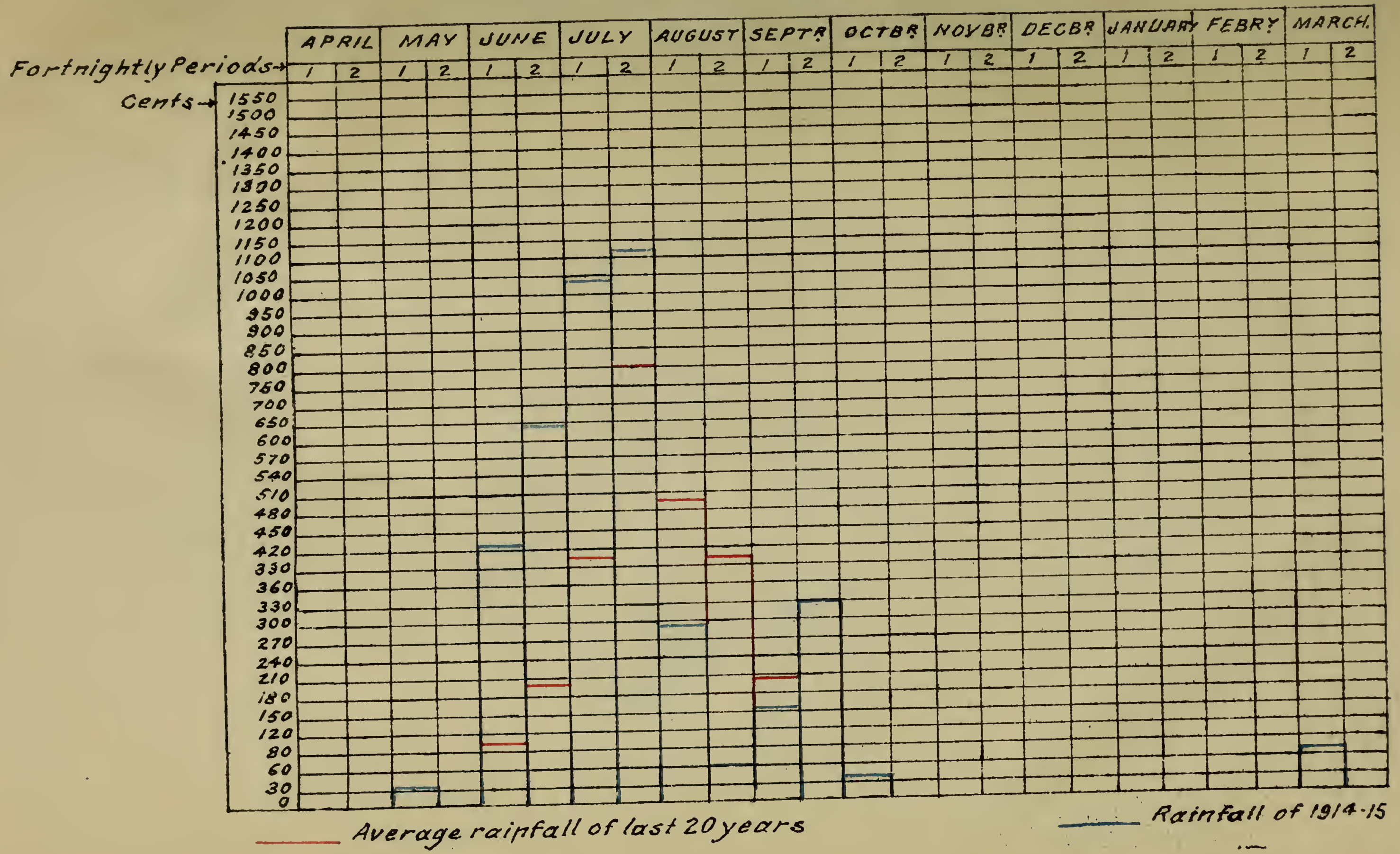
1916.

RAINFALL DIAGRAM.

1914-15

NADIAD AGRICULTURAL STATION.



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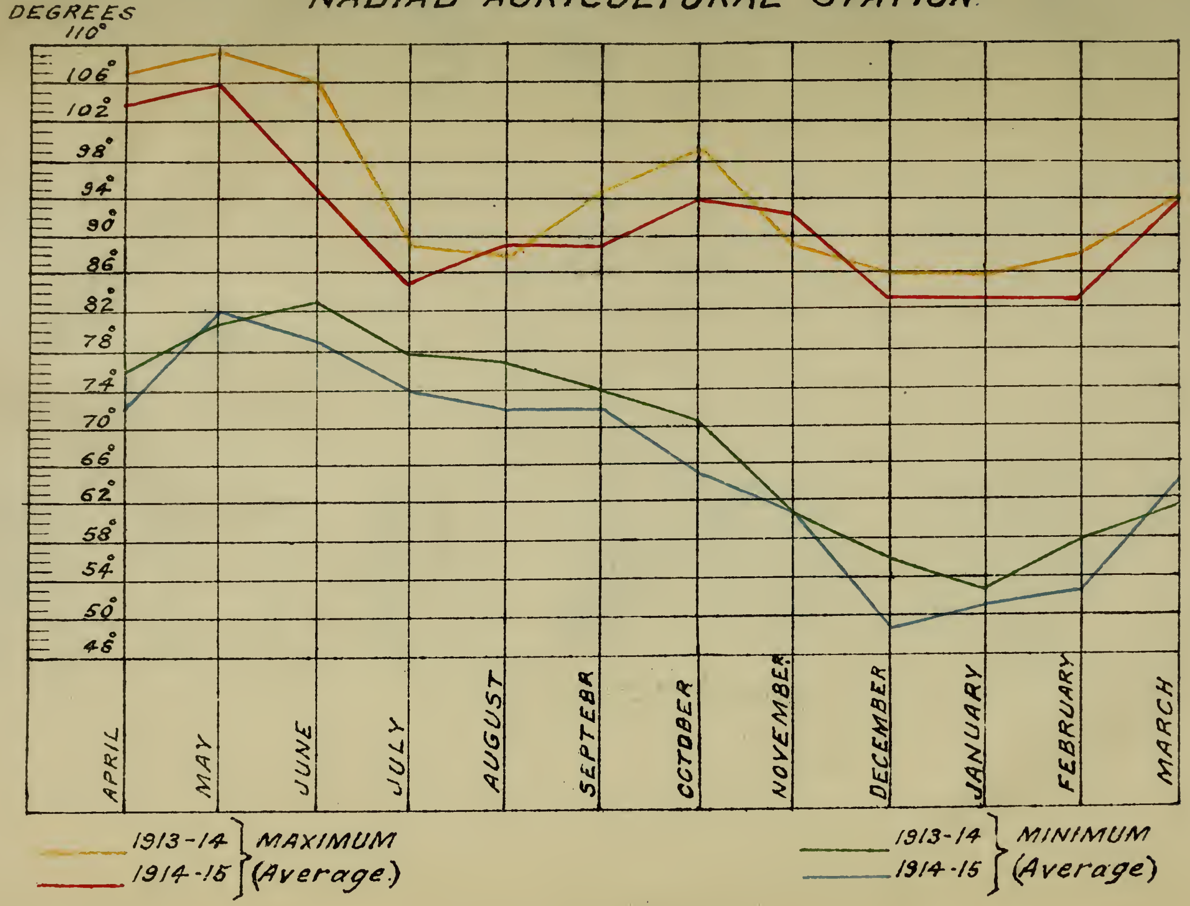
TEMPERATURE GRAPH

1913-14 & 1914-15.

NADIAD AGRICULTURAL STATION.



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630.8
N12
1914/15

Vernacular names of crops, &c, mentioned in the Report with their Botanical and English equivalents.

Vernacular.	English.	Botanical.
	Cereals.	
Dangar, Bhat ...	Rice ...	Oryza sativa.
Bajri, Bajro ...	Bulrush, millet ...	Pennisetum typhoideum.
Kodra ...	Kodra, millet ...	Paspalum scrobiculatum.
Sundhia ...	Great, millet ...	Andropogon sorghum, var. cernum.
Bavto ...	Muma millet ...	Eleusine coracana.
Ghau ...	Wheat ...	Triticum vulgare.
	Pulses.	
Tuer ...	Pigeon-pea ...	Cajanus indicus.
Mag ...	Green gram ...	Phaseolus mungo.
Math ...	...	Phaseolus aconitifolius.
Guvar ...	Cluster bean ...	Psyamopsis psoraliodes.
Wal ...	Indian gram ...	Dolichos lablab.
	Soy beans ...	Glycine hyspida.
	Oil-seeds.	
Tal ...	Sesamum ...	Sesamum indicum.
Diveli ...	Castors ...	Ricinus communis.
Bhoising, magfali ...	Groundnut ...	Arachis hypogæa.
	Fibre plants.	
Broach or Kanami, or Gaghari, Lalio Buri, Cambadia.	Cottons	Gossypium herbaceum.
Sheria ...	Brown hemp ...	Hibiscus cannabinus.
San ...	Bombay hemp ...	Crotolaria juncia.
	Narcotics.	
Tamaku ...	Tobacco ...	Nicotiana tobaccum.
	Vegetable.	
Batata ...	Potato ...	Solanum tuberosum.
	Fodder crops.	
Berseem ...	Egyptian clover ...	Trifolium alaxandrium.
Makai ...	Maize ...	Zea maize.
Kang ...	Italian millet ...	Setaria italica.
Cheno ...	Inferior millet ...	panicum miliaceum.
Bauti ...	Do.	Panicum crus-galli.

One acre = 40 gunthas.

THE NADIAD AGRICULTURAL STATION.

1914-15.

1. Established in 1903; North Latitude—22°; East Longitude—73°; Eelevation—approximately sea level; Soil—alluvial loam (varnacular-Goradu); Average (past 20 years) rainfall—38·92 inches; Average (past 9 years) temperature—mean maximum 106·4°-F. in May and mean minimum 51·2°-F. in January.

Area—44 acres.

Superintendent—Mr. T. M. Thaker, L. Ag.

Season.

2. The season was not a good one owing to the irregular distribution of the heavy rainfall which amounted to 42 inches or roughly 50 per cent. above the average. More than half of this rain fell in the month of July in which there were 26 rainy days which stunted the growth and made the colour of the crops turn pale. There was a long break from the 5th August to the 8th September, save for a few showers on 5 or 6 days aggregating in all to an inch. This proved a serious drought and although the heavy rains in the middle of September did some good, they damaged crops like Bajri which had reached the flowering stage.

The kodra and sann crops were sown on the 10th June, but owing to heavy rain on the 11th kodra had to be resown. Bajri sowings were completed by the end of June. This crop sown alone did well, but did poorly in the mixture owing to the vigorous growth of the subsidiary pulse crops. The cotton crop did not suffer seriously from the weather conditions but 'wilt' (Fusarium) caused severe damage, some plots being practically wiped out. White-ants also did much damage to this crop.

Castors grew well, but capsule-borer seriously reduced the outturn. Til suffered equally from drought and insect pests while tur and other pulses did not yield in proportion to their vegetative growth.

The tobacco crop was adversely affected by the absence of rain at the proper time for transplanting, *viz.*, the latter half of August and no opportunity presented itself, till the 8th September, but cultivators resorted to irrigation and planted nearly half the crop by this means. Heavy rain in the middle of September spoiled the crop; the older plants grew rank and lost 3 or 4 of the bottom leaves while the recently planted seedlings rotted and many gaps required to be filled up. During the cold weather the crop improved, but heavy fogs and rain at the time of ripening and also after harvest damaged the leaf and materially reduced the outturn. The loss to the cultivator was further aggravated by the very low market rates.

3. *Crop Pests.*—Most of those mentioned in last year's Report appeared again. Katra caterpillar destroyed the soy-bean crop and slightly damaged

cotton and sann. Small grass-hoppers severely damaged the sann crop by nipping off the leading shoots. Til was damaged by the top-shoot-borer and castors were badly damaged by the capsule borer. Stem borer was severe on wheat. Among the fungoid pests 'wilt' (Fusarium) was very severe on cotton and rust and smut materially reduced the outturns of Dhola and Bansi wheats, completely destroying some of the former grown in a rice plot. Rats were very injurious in the season under report almost completely destroying the math crop, severely damaging the wheat crop and causing much injury to cotton and tur.

Cotton 'wilt' (Fusarium sp.).—This disease has caused serious damage on the Nadiad Farm for upwards of a decade and no variety is immune to it. Buri cotton which has some reputation for wilt resistance, was badly damaged with this desease in the year under report. The fungus apparently exists in the soil where it persists for a very long time. In 1906-07 and 1907-08 Broach cotton was sown in plot 97 and proved a complete failure in the latter year due to 'wilt'. The site was then turned into an orchard and no cotton was grown on it till 1914-15 when Lalio was sown only to be totally destroyed by 'wilt' and white-ants.

4. All the analyses given in the Report were kindly made by the Agricultural Chemist to the Government of Bombay.

The experimental work of the year is reported under the following sections :—*

Section I.—Crop experiments.

„ II.—Manurial experiments.

„ III.—Cultural experiments.

„ IV.—Rotational experiments.

SECTION I—CROP EXPERIMENTS.

Tobacco.

5. The comparative test between White Burley, Cavalla and local was repeated in the year under Report with the results noted below. Although the outturn is much below normal the local variety easily heads the list as regards yield. White Burley seed was imported from America in 1911-12 and hence this is the fourth generation raised from the original seed. Seed from protected flowers has always been secured and it is therefore important to note that this variety has deteriorated at Nadiad. Not only have the good colour and fine texture of the leaf been lost, but the size and shape of the leaf itself have disappeared. The Turkish tobacco Cavalla has yielded much below local and this result has been consistent throughout the three years during which this tobacco has been under trial.

---

* In all estimates showing profit or loss no allowance is made for rent and taxes.

Plot No.		Area of each plot in Gunthas.	Name of the variety.	Date on which transplanted.	Yield of cured leaf in lbs. per acre.		
Original.	Duplicate.				Original.	Duplicate.	Average.
29	40	10	Local	7th September 1914.	1,396	1,436	1,416
30	41	10	White Burley (Seed introduced from U. S. A. in 1911-12).	5th to 6th September 1914.	1,120	1,080	1,100
28	39	10	Cavalla	6th and 7th September 1914.	1,076	1,148	1,112

6. Seed of these two varieties was also obtained from Burihat Farm in Bengal where they have given good results, but the crops were inferior to those grown from the seed imported direct.

7. The several varieties referred to in para. 4 of last year's Report were again grown but fared the same fate of deterioration. Fresh seed of these varieties including White Burley was received late in the year under Report and only a few plants could be raised, but the results were similar to those obtained in 1912-13 in the case of White Burley, *viz.*, a fine texture and good colour.

8. A small trial was made with Pusa No. 26 strain, seed of which was received from the Imperial Economic Botanist. It had a tall habit of growth and a very long internode. The leaf had a somewhat lanceolate shape; the texture of the leaf was thick and the colour satisfactory.

9. The experiment of manuring heavily with potash manures started in 1910-11 and described in para. 6 of that year's Report was continued in the season under report with the results noted below. It will be observed that the composition of the ash shows little sign of improvement. The percentage of potash is still very low and the leaf grown on those plots which received no potash head the list in this respect. The percentage of chlorine is still extremely high which is no doubt due to the large amount of dissolved sodium chloride in the irrigation water. The percentage of sulphuric acid also remains too high. The figures given in italics in statement 1, refer to the crop grown in the year under Report (1914-15). It will be noted that in most cases there is a decrease of potash due perhaps to the wet season. There is also a decrease in chlorine, but it still remains very high.

STATEMENT I.

*Percentage Composition of Tobacco leaf, the crop of which has been manured with—
(1913-14 crop).*

Kind.	Quantity per acre in addition to 20,000 lbs. farmyard manure.														
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Sulphate of Potash $=K_2O$	100	100	100	50	50	50									
Wood Ashes $=K_2O$							100	100	100	50	50	50			
Superphosphate		300	300		300	300		300	300		300	300		300	300
Sodium Nitrate			200			200			200			200			200
Ash.	Per cent. 20·43	Per cent. 19·64	Per cent. 20·60	Per cent. 21·30	Per cent. 21·50	Per cent. 20·01	Per cent. 20·50	Per cent. 20·58	Per cent. 19·85	Per cent. 21·14	Per cent. 20·40	Per cent. 22·08	Per cent. 18·90	Per cent. 20·00	Per cent. 21·4
Containing Sand	1·19	1·96	2·45	1·57	3·53	1·81	2·36	2·56	2·81	2·02	2·12	3·68	2·72	2·08	2·26
,, Lime	6·25	6·68	6·94	7·28	4·86	6·94	6·27	6·29	5·82	6·87	6·38	6·83	6·32	6·49	6·72
,, Magnesia	2·52	2·40	2·80	3·44	1·40	2·80	2·00	3·20	1·60	2·40	3·40	2·24	2·40	2·80	2·88
,, Sulphuric acid	0·80	1·12	1·06	0·86	0·92	0·88	0·77	0·98	0·92	0·75	0·65	0·82	1·46	1·41	1·18
,, Chlorine	3·24 *2·88*	2·52 *2·70*	3·24 *2·16*	3·24 *1·98*	3·24 *1·98*	2·88 *2·34*	3·60 *2·88*	3·24 *2·88*	3·42 *2·52*	3·24 *2·16*	3·06 *2·16*	3·24 *2·16*	3·60 *2·88*	2·70 *2·70*	3·96 *1·80*
,, Potash	1·20 *0·70*	1·63 *1·09*	1·72 *0·59*	1·01 *1·24*	0·91 *0·74*	0·97 *0·58*	1·01 *0·58*	1·49 *0·50*	1·65 *0·49*	0·94 *0·82*	1·01 *1·12*	0·97 *1·55*	1·95 *0·43*	1·40 *0·58*	2·46 *0·68*

STATEMENT II.

Percentage Composition of Ash.
(1913-14 crop).

	Manurial Treatment.	Percentage of Potash K_2O to total Ash.	Percentage of Lime CaO to total Ash.	Percentage of sulphuric acid to total Ash.	Percentage of chlorine to total Ash.	Total ash.
	100 lbs. K_2O in Sulphate of Potash.	5·87	30·59	3·91	10·96	20·43
1	100 lbs. K_2O in Sulphate of Potash. 300 lbs. Superphsophate	8·30	34·01	5·70	12·83	19·64
3	100 lbs. K_2O in Sulphate of Potash. 300 lbs. Superphosphate 200 lbs. Sodium nitrate	8·35	33·69	5·14	15·73	20·60
4	50 lbs. K_2O in Sulphate of Potash.	4·74	34·18	4·04	15·21	21·30
5	50 lbs. K_2O in Sulphate of Potash. 300 lbs. Superphosphate	4·23	22·60	4·28	15·07	21·50
6	50 lbs. K_2O in Sulphate of Potash. 300 lbs. Superphosphate 200 lbs. Sodium Nitrate	4·85	34·68	4·40	14·39	20·01
7	100 lbs. K_2O in Wood ashes	4·93	30·58	3·76	17·56	20·50
8	100 lbs. K_2O in Wood ashes 300 lbs. Superphosphate	7·24	30·08	4·76	15·74	20·58
9	100 lbs. K_2O in Wood ashes 300 lbs. Superphosphate 200 lbs. Sodium nitrate	8·31	29·35	4·64	17·23	19·85
10	50 lbs. K_2O in Wood ashes	4·44	32·50	3·55	15·32	21·14
11	50 lbs. K_2O in Wood ashes 300 lbs. Superphosphate	4·95	31·28	4·02	15·00	20·40
12	50 lbs. K_2O in Wood ashes 300 lbs. Superphosphate 200 lbs. Sodium Nitrate	4·39	30·93	3·71	14·67	22·08
13	No artificials	10·32	33·44	7·72	19·05	18·90
14	300 lbs. Superphosphate	7·00	32·45	7·05	13·50	20·00
15	300 lbs. Superphosphate 200 lbs. Sodium Nitrate	11·46	31·31	5·50	18·45	21·46

A supplementary experiment was conducted on local tobacco as well as White Burley, Hector and Aysolonk in which very heavy dressings of potash, in the form of sulphate were applied, but the following statement shows that the composition of the leaf in none of these varieties was appreciably improved.*

Name of Variety.	Percentage of potash and chlorine in leaf. K_2O at the rate of lbs. per acre.			
	200	300	400	500
	Potash			
Local	0·66	0·78	0·62	0·87
White Burley	0·81	0·85	0·93	1·05
Hector	0·78	0·78	0·89	1·20
Aysolonk	1·12	0·78	1·05	1·05
	Chlorine			
Local	2·52	2·70	2·16	1·98
White Burley	2·16	2·70	3·06	3·60
Hector	1·80	2·16	1·98	3·42
Aysolonk	2·88	3·78	1·80	1·98

Cotton.

10. The experiments with Cambodia (fresh seed from Gadag, Buri Lalio and Ghoghari cottons noted in para. 8 of the 1913-14 report was continued in the year under report. These trials were conducted under the same conditions as hitherto, *viz.*:—

I. Sown in May with the aid of irrigation.

II. Sown at the beginning of the monsoon—

(*a*) not to be irrigated in the cold weather.

(*b*) to be once or twice irrigated in the cold weather.

The results obtained in the year under report are recorded below, but are not of much value for comparative yield purposes owing to the uneven distribution of the damage caused by 'wilt' (Fusarium Sp.).

---

* The analyses of the leaf of the several other varieties tried in the year under report will be found in Appendix XIII.

Name of Variety.	Yield in lbs. of seed cotton			Ginning percentages.		
	I.	II *a.*	II *b.*	I.	II *a.*	II *b.*
Buri	911	293	286	30·82	30·53	31·15
Cambodia	662	276	338	33·07	34·29	35·07
Lalio	684	554	498	35·27	36·05	34·4
Ghoghari	93	400	426	37·18	37·8	37·56

11. In the year under report the May-sown cottons were sown at the end of that month and the monsoon crop about a fortnight later, but owing to the continuous rains the former which had a good start progressed well.

The yields are below the average owing to the severe attack of 'wilt' and the harmful effects of the heavy continuous rains which fell in July and August. The ginning percentages are better this year than they were during the last two years in all cases except Ghogari (II *a*).

12. Comparative trials of these cottons grown under the three conditions mentioned above have now been conducted for four seasons. The year 1911-12 was a partial famine one, but it will be useful to tabulate the results obtained during the last three seasons in the following statement:—

Yield of Seed cotton in lbs. per acre.

Name of Variety.	I.					II *a*.					II *b*.				
	1912-13.	1913-14.	1914-15.	Total.	Average.	1912-13.	1913-14.	1914-15.	Total.	Average.	1912-13.	1913-14.	1914-15.	Toal.	Average.
Buri	1,056	1,022	911	2,989	966	327½	568	293	1,188½	396	745½	410	286	1,441½	480½
Cambodia	,592	897	662	3,151	1,050	395	398	276	1,069	356	725	406	338	1,469	489⅔
Lalio	1,494	1,263	684	3,441	1,147	1,072½	346	554	1,992½	657½	545	916	498	1,959	653
Ghoghari*			93	93	93	200	960	400	1,560	520	1,100	1,036	426	2,562	854

Ginning percentages.

Name of Variety.	I					II *a*.					II *b*.				
	1912-13.	1913-14.	1914-15.	Tota .	Average.	1912-13.	1913-14.	1914-15.	Total.	Average.	1912-13.	1913-14.	1914-15.	Total.	Average.
Buri	30·00	28·85	30·82	89·67	29·89	30·10	28·84	30·53	89·47	29·82	29·00	30·48	31·15	90·63	30·21
Cambodia	30·50	32·87	33·07	96·44	32·15	32·50	32·96	34·29	99·75	33·25	32·20	32·59	35·07	99·86	33·29
Lalio	33·50	34·34	35·27	103·11	34·37	33·70	36·32	36·05	106·07	35·36	34·	36·08	34·40	104·48	34·83
Ghoghari*			37·18	37·18	37·18	39·70	35·26	37·80	112·76	37·59	36·50	37·49	39·56	111·55	37·18

* **Ghoghari** was tried in one season only in the month of May when it was almost wholly destroyed by 'wilt' (Fusarium) and white-ants.

13. *Ghoghari.*—As a monsoon-grown crop when irrigated in the cold weather the Ghoghari heads the list as regards yield while in respect of ginning percentage this cotton stands well a-head of all other cottons in each season and under each condition of cultivation and it seems probable that this cotton will prove to be the most suitable annual variety for Kaira district more particularly if fresh seed of selected strains be introduced at short intervals from Broach. In comparison with Lalio it is true that the fibre of Ghoghari is somewhat inferior, but this does not seem to be a serious drawback as the market is very unsensitive to differences in quality. This cotton or rather a mixture containing Ghoghari known as Kanvi is already finding favour with the cultivators of Kaira district who import seed from the Kanam tract.

14. *Lalio.*—This cotton does not concede much to Ghoghari in point of yield, but it appears to be distinctly inferior in point of ginning percentage.

15. *Cambodia.*—As regards Cambodia it seems to be now definitely established that this cotton deteriorates in ginning percentage in the first season to such an extent that it ceases to count as a high ginning cotton—one of its strongest points in other parts of India. Nevertheless on land free from infection with Fusarium it is extraordinarily prolific as will be gathered from the following results obtained on favoured plots,

Year.	Yield of seed cotton in lbs. per acre.	Remarks.
1912-13	1,592	
1913-14	1,041	
1914-15	1,405	Notwithstanding a severe attack from aphis which made the plants drip profusely for a couple of months.

This cotton, when sown in May, reaches the bearing state a month to six weeks earlier than Lalio or Ghoghari and continues to yield until these two cottons have given their last picking. In this connection it has been observed that on soil in rich condition, maturity is hastened. For these reasons and also on accounts of its superior fibre this is probably the most profitable cotton for a careful cultivator to grow on 'wilt' free lands and where irrigation is available in May, but to the average careless cultivator (who represents the majority), with or without a well, it would seem safer to recommend Ghoghari.

16. *Buri.*—With regard to Buri it has been observed that this cotton is very early and is also a satisfactory yielder when grown on 'wilt' free land. The following outturns from the May sown area have been obtained in past years.

Year.	Yield of seed cotton in lbs. per acre.	Ginning percentages.
1912-13	1,056	30·00
1913-14	1,022	28·85
1914-15	911	30·82

The fibre is not as good as that of Cambodia, but its ginning percentage is its least satisfactory character and this cotton cannot be recommended. Immunity to 'wilt' (Fusarium) has been claimed for this cotton in other parts of India, but at Nadiad it is only a decree less susceptible to this disease than are other cottons. Both on this Farm and at Dohad in the year under report this cotton has suffered much more severely from frost or cold weather than other cottons.

To sum up the only substantial advantage which this cotton possesses over others is its early maturing character, but this does not appear to be sufficient to make it a more profitable cotton to grow in Kaira district than Cambodia, Lalio or Ghoghari cottons

17. Cambodia and Lalio cottons were grown on a large scale for the purpose of seed production and while the results obtained are not comparable it may be of interest to summarize them in the following statement :—

Plot Nos.	Name of variety.	When sown.	Area sown.		Outturn per acre in lbs. of seed cotton.	Bemarks..
			Acre.	Gunthas.		
81 to 85	Cambodia	May	1	10	495¾	Damage by wilt was about 20 gunthas in plots 82 to 84, growth very stunted.
48 to 50 56 to 58	Do.	,,	1	30	1,094½	Damage very slight. Growth very vigorous.
96 to 101	Lalio	,,	1	32	605⅓	Damage very severe in 97 to 101 about 17½ gunthas in area and 2½ gunthas in 96.

These cottons suffered very heavily from 'wilt' (Fusarium), white-ants, aphis and rats and although Lalio was at one time a very vigorous crop its yield did not come up to expectations.

18. Hand samples of Cambodia and Lalio cottons were forwarded to the Imperial Cotton Specialist for opinion with the results noted below :—

Name of cotton.	Report by Messrs. Tata Sons & Co., Bombay (through the Imperial Cotton Specialist).	
	Valuation* in Rs. per khandy.	Remarks.
Cambodia	230	It has not the feel of Cambodia though the staple has suffered in no way. The feel is course: can spin 24s. warp.
Lalio	215	This cotton has also lost its soft feel on the Nadiad Farm. The staple is not affected in any way. Can spin 20s. warp.

* Basis for valuation was Rs. 220 for fine Broach
240 ,, fine surat.
260 ,, fine Naosari.

Selection.

19. This was confined to selecting a few plants from a crop of Cambodia cotton grown from newly introduced seed from Gadag with a view to maintaining the ginning percentage.

Hybridization.

20. The hybrids reported in paras. 16 to 18 of last year's Report were not retained as it was thought unnecessary to proceed with this work in view of the fact that the chief cotton problem at Nadiad is to find a suitable variety from among the existing cottons at our disposal.

Wheat.

21. Comparative trials were continued with the varieties Tamra, Bansi, Dhola and Popatia, but these trials were largely vitiated owing to severe attacks of rust and smut which caused great damage to Bansi and Dhola while Tamra suffered to only a slight extent. Popatia suffered no appreciable damage from these fungoid diseases, but white-ants, stem-borer (Nonagria uniformis) and rats did great damage to all the varieties.

The only variety to leave a profit was Tamra (a hard yellow wheat). The results obtained with this wheat and the local variety Popatia are tabulated below :—

Name of Variety.	Yield of in lbs.	1909-10	1910-11	1911-12*	1912-13	1913-14†	1914-15	Average.
Tamra	Grain	1,501	1,152	844	1,350	874	1,306	1,171
	Straw	3,840	3,008	2,604	2,430	2,760	3,590	3,039
Local Popatia	Grain			1,040	1,110	678	1,033	965
	Straw			2,776	2,938	1,353	2,804	2,468

* This was a scarcity year when all crops yielded poorly.

† The crop was seriously damaged by rats and white-ants and *stem-borers* were also severe as were also rust and smut but Tamra suffered less than other wheats from these fungoids.

The Tamra variety requires the same time to mature as Popatia does and has given uniformly good results since its introduction from the United Provinces in 1909-10.

Under these circumstances it has been decided to reject all other varieties and to accept Tamra as the most suitable variety for Nadiad conditions.

23. The work of selection on spikelets and tillering was continued during the year under report and the work done is recorded in appendices X and XI.

24. Owing to the severe attack of rust in 1913-14 the selected plants for rust resistance were rejected that year and selection was recommenced in the year under Report, when 20 rust free plants in each of the varieties of Dhola-white and Shet Parner have been selected.

Hybridization.

25. The cross Wagia x Popatia mentioned in para. 21 of last year's Report reached the F_4 generation. The seed of the two plants which *resisted* rust to some extent last year gave rise to plants having only Wagia characters and all were attacked by rust. Five ear-heads of each of these (last year) plants have been retained.

26. The new crosses mentioned in para. 24 of last year's Report reached the F_2 generation, and the off-spring of the eight plants of Dhola x Popatia were noted on as follows :—

"Ear-heads long like Popatia and bulky like Dhola. Arrangement of spikelets intermediate, glumes pointed unlike Popatia; awns spreading and long like Dhola. Grains like Popatia, colour of the grain slightly white Rust though present was slight."

The off-spring of the two plants of Popatia x Dhola were noted on as follows—The characters mentioned under Dhola x Popatia were also observed in this cross.

27. The natural crosses mentioned in para. 23 of last year's Report reached the F_2 generation.

One plant found in Dhola.—Last year the ear-heads were all like those of Popatia. In the year under report all the plants were uniform in character rather intermediate between Popatia and Dhola but with a greater tendency to Popatia. Five ear-heads are retained for supplying seed for further observations.

As regards the others, this year's crop bred true to last year's parents and hence the originals were probably rogues and not true crosses. These have been rejected.

28. A collection of Presidency wheats was grown for observation. Except the Khapli or Popatia varieties all were attacked by rust. In some an admixture of Wagia was found, but pure seed of each was secured.

Bajri.

29. Awned bajri was given a further trial on a large scale of 2½ acres. The land was in good condition and the crop grew well but the stalks became very coarse. In spite of the heavy rainfall on the 11th July damaging the western portion of the area, the crop yielded at the rate of 700 lbs. of grain and 3,072 lbs. of kirbi per acre.

30. This variety was also grown under comparison with local and three other varieties. All grew tolerably well but there were a few vacant patches owing to the damage caused by the heavy rain amounting to 6·45 inches in 5 hours on the 11th July. Some damage was also caused by Canthardis beetles at the flowering time. The results which agree with

those obtained last year, are tabulated below and show that the local variety easily holds its own against all comers :—

Name of the variety.	Yield per acre in lbs.		Remarks.
	Grain.	Fodder.	
Local	596	2,628	The cost of production was at the rate of Rs. 13-8-0 per acre.
Bhaonagari	164	1,284	
Baroda	248	1,460	
Awned	221	1,435	
Poona	476	2,304	

Selection.

31. The seed of last year's selected plants was sown, but unfortunately inopportune rain spoiled germination. The reserve was then sown but the plants did not fare well and the crop became stunted and the ear-heads in consequence very poor. Nevertheless a limited quantity of guarded seed as tabulated below was secured for continuing the work next season. Owing to the failure of the ear-heads to develop in the case of Bajro no guarded seed could be secured while the Baroda selections were discontinued as the variety was similar to local bajri.

Name of Variety.	Selections made in						Remarks,
	1913-14 Selected plant.			1914-15 Selected plant.			
	Serial No.	No. of tillers.	No. of earheads obtained	Serial No.	No. of tillers.	No. of bagged ear-heads obtained	
Local	1	33	10	1	4	2	
	2	32	8	2	4	2	
	3	22	7	3	6	1	
	4	13	9	4	0	0	Rejected as the ear-heads were not typical.
	5	14	7	5	6	1	
	6	11	6	6	4	2	
	7	12	5	7	3	2	
	8	12	5	8	7	1	

<table>
<tr><th rowspan="3">Name of Variety.</th><th colspan="6">Selection made in .</th><th rowspan="3">Remarks.</th></tr>
<tr><th colspan="3">1913-14.
Selected plant.</th><th colspan="3">1914-15.
Seleted plant.</th></tr>
<tr><th>Serial No.</th><th>No. of tillers.</th><th>No. of ear-heads obtained.</th><th>Serial No.</th><th>No. of tillers.</th><th>No. of bagged. ear-heads obtained.</th></tr>
<tr><td>Awned</td><td>1</td><td>25</td><td>5</td><td>1</td><td>7</td><td>1</td><td></td></tr>
<tr><td></td><td>2</td><td>20</td><td>5</td><td>2</td><td>3</td><td>1</td><td></td></tr>
<tr><td></td><td>3</td><td>17</td><td>7</td><td>3</td><td>0</td><td>0</td><td>Do.</td></tr>
<tr><td></td><td>4</td><td>21</td><td>5</td><td>4</td><td>7</td><td>1</td><td></td></tr>
<tr><td></td><td>5</td><td>26</td><td>3</td><td>5</td><td>0</td><td>0</td><td>Do.</td></tr>
<tr><td></td><td>6</td><td>21</td><td>4</td><td>6</td><td>5</td><td>2</td><td></td></tr>
<tr><td></td><td>7</td><td>15</td><td>6</td><td>7</td><td>0</td><td>0</td><td>Do.</td></tr>
<tr><td></td><td>8</td><td>16</td><td>4</td><td>8</td><td>4</td><td>1</td><td></td></tr>
</table>

OIL SEEDS.

Castors.

32. The seven varieties of castors mentioned in para. 28 of last year's report were grown on a small scale. These are all local varieties except two, Dharwar White and Brisbane. The latter will not be retained as it does not appear to be a pure type and is moreover a very poor yielder due largely to the characteristic of shedding its seed in the field when ripe. Moti Chani is more or less similar to Chani. Dharwar white is a good variety and has a higher oil content than Paras.

33. The season was not a good one for castors as the excessive rains caused the plants to grow very tall and to branch sparsely while the heads were small. Moreover most of the capsules were damaged by borer (Dichocrocis punctiferallis). For these reasons the produce from the small plots could not be subjected to a ghani crushing test. The yields and chemical analyses are tabulated below :—

Name of the variety.	Yield per acre in lbs.	Percentage of oil.	Remarks.
Paras	800	47·50	
Mota Paras	768	49·70	
Purple stemmed	512	48·80	
Chani	1,184	49·70	
Moti chani	480	49·10	
Dharwar white	656	49·40	
Brisbane	336	49·60	To be rejected.

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Selection.

34. The plants grown from the guarded seed reported in para. 29 of last year's Report did not grow well and produced small heads and every capsule was attacked by borer. Bagging proved very difficult but a small quantity of guarded seed as noted below has been secured :—

Name of Variety.	Plant numbers selected in				Guarded seed obtained in ozs. in 1914-15.
	1911-12.	1912-13.	1913-14.	1914-15.	
Paras	1	2 1	2 2 1	1 2 2 1	6·25
Do.	,,	,,	,,	2 2 2 1	800
Mota paras			1	1 1	1·75
Do.			2	1 2	0·75
Purple stemmed	1	3	1 3	1 1 3	2·00
Do.		4	1 4	1 1 4	2·50
Moti chani	1	1 1	1 1	1 1 1	1·50
Do.	,,	,,	,,	2 1 1	0·50
Dharwar A. white	1	1 1	1 1 1	1 1 1 1	0.50
Do.	,,	2 1	1 2 1	1 1 2 1	0·50
Do.	,,	2 1	1 3 1	1 1 3 1	0·25

Selection—contd.

Name of Variety.	Plant numbers selected in				Guarded seed obtained in ozs. in 1914-15.
	1911-12.	1912-13.	1913-14.	1914-15.	
Dharwar A. white	1	4 1	1 4 1	1 1 4 1	3·50
Do.	,,	,,	,,	2 1 4 1	1·50
Do.	,,	5 1	1 5 1	1 1 5 1	1·50
Do.	,,	,,	,,	2 1 5 1	2·25
Do.	,,	,,	,,	3 1 5 1	2·50

Til.

35. Progress with this crop is very slow. In each of the seasons 1911-12, 1912-13 and 1913-14 the work has been vitiated by some adverse factor in the weather or some insect pest. The year under report has proved no exception to the rule as Top shootroller (Antigastra catalaunalis) prevented the formation of capsules. With this crop bagging is difficult as the growing shoot when covered bends over and rotting of the soft tissue follows with the result that little fertilized seed is obtained and that little is poorly developed.

However a small quantity of self fertilized seed from a few capsules of seven good plants in the local white variety has been secured and work on til will be confined to this variety in future.

PULSES.

Tur.

36. It was noted in para. 31 of last year's Report that fresh seed has been obtained of the varieties, Sambalpore, Bilaspore and Bangalore. These varieties were again tried in the year under report along with the local types, but these varieties did not do so well as the local tur. They took a day longer to germinate and their growth was stunted. The seeds of

Sambalpore and Bilaspur are very small. All these turs were sown two feet apart both ways which proved too little and the bearing was mostly found on the tips of the branches. The results obtained during the last two years are tabulated below from which it will be seen that the introduced varieties are very poor yielders and they will now be rejected :—

Name of the Variety.	Yield per acre of grain in lbs.	
	1913-14.	1914-15.
Sambalpur	40	480
Bilaspur	20	640
Banglore	10	200
Indo-China	320	780
Local white-grained	400	500
Local red-grained	240	770
Local white-podded	360	620
Local black-podded	440	620
Local mottled-podded	360	680
From the Bazar	160	720

Selection.

37. The selection work among the local types commenced last year, was continued in the year under report and all the plants with one or two exceptions came true to type. The following statement summarizes the work done and shows the quantity of guarded seed obtained —

Number.	Name of the type.	Selection made in				
		1913-14.		1914-15.		
		Selected plants.		Selected plants.		
		Registered number.	Number of guarded seeds obtained.	Registered number.	Number of guarded seeds obtained.	
1	White podded and white grained A.	1	5	1	40	
	Do.	2	4	2^{1}	22	
	Do.			2^{2}	12	

Number.	Name of the type.	Selection made in				Remarks.
		1913-14.		1914-15.		
		Selected plants.		Selected plants.		
		Registered Number.	Number of guarded seeds obtained.	Registered Number.	Number of guarded seeds obtained.	
2	White podded and white grained B.	1	1	1	74	
	Do.	2	7	2	29	
	Do.	3	2	3	17	
	Do.	4	3	4	13	
	Do.	5	7	5	3	
3	White podded and red grained.	1	3	1	22	
	Do.	3	6	3	17	
4	Mottled podded an white grained.	1	2	1	44	
	Do.	2	2	2	61	
5	Black podded and white grained.	1	1	1	38	
	Do.	2	2	1	33	
	Do.	3	9	3^{1}	17	
	Do.			3^{2}	18	
	Do.	4	11	4^{1}	8	
	Do.			4^{2}	5	
	Do.	5	6	5^{1}	30	
	Do.			5^{2}	25	

Guvar.

38. Five varieties were compared for yield on one-guntha plots. The plants grew well until the middle of August when they suffered from the physiological desease which causes the leaves and growing shoots to darken and curl up; but fortunately the crop recovered from this disease by the end of September and Pardeshi and Makhania were the only varieties which did not yield well. The results are tabulated below: —*

Name of the Variety.	Yield per acre in lbs.		Remarks.
	Grain.	Bye-product.	
Sotia local	840	920	
Sotia Surat	900	960	
Rosy	960	1,040	
Pardeshi	480	800	
Makhania	240	280	

---

* The analyses of these guvars is recorded in Appendix XIV.

Selection.

39. Selection was begun in the year under report among the five varieties mentioned above and the work done is summarized in the following statement:—

Name of Variety.	Selection in 1914-15.			Remarks.	Name of Variety.	Selection in 1914-15.			Remarks.
	Registered No. of plant.	No. of pods obtained.	No. of grains obtained.			Registered No. of plant.	No. of pods obtained.	No. of grains obtained.	
Sotia local.	1	4	25		Pardeshi	1	3	15	
	2	5	39	Good plant		2	5	17	16 other grains.
	3	3	23			3	10	63	Shrivelled
	4	9	71	Do.		4	5	41	Good plant.
	5	3	17			5	4	17	
	6	3	22	Do.		6	4	21	
	7	2	10	Shrivelled up.		7	5	33	
	8	3	20		Makhania.	1	6	27	
	9	3	21			2	15	98	
	10	5	34			3	5	32	
						4	4	20	
Sotia Surat	1	3	23			5	19	132	Good plant.
	2	1	5			6	4	30	Do.
						7	7	41	
Rosy	1	14	69			8	4	30	Do.
	2	7	46			9	6	45	Do.
	3	10	86	Good plant					
	4	14	117	Do.					
	5	10	76						
	6	8	51						
	7	10	70						
	8	9	65						
	9	9	75	Do.					
	10	17	119						
	11	12	65						
	12	10	79	Do.					
	13	15	70						
	14	10	46						
	15	7	44						

Fodder Experiments.

40. The experiments described in the last two annual Reports designed for the purpose of ascertaining the most useful emmergency fodders useful at the different seasons of the year as regards—

(1) rapidity of yielding,

(2) quantity of outturn per unit of area,

(3) cost of production.—were continued and the results obtained in the year under report are tabulated in the following statement :—

Date of Sowing.	No. of irrigations given.	Yield per acre in lbs.		Period of growth in days.	Cost of production per acre in Rs.	Cost of production in lbs. per rupee (dry).	Remarks.
		Dry.	Green.				
		MAIZE.					
15th August 1914	3	3,780	10,800	52	34·65	109·1	
15th September ,,	5	3,200	10,000	54	55·44	57·7	
15th October ,,	6	4,120	10,920	68	68·16	60·5	
15th November ,,	7	1,280	3,720	81	71·98	17·9	The germinating young plants were up-rooted by rats and hence growth was uneven.
15th December ,,	10	1,526	4,360	105	92·39	16·6	
15th January 1915	8	2,545	7,400	78	86·45	29·4	
15th February ,,	7	1,119	3,880	64	77·31	14·4	Half the area spoiled, as above and thence omitted in the average.
15th March ,,	8	7,303	21,480	58	84·23	86·6	
15th April ,,	8	2,897	8,320	53	68·92	42·05	
15th May ,,	7	2,169	6,440	54	61·39	35·3	
Average		3,202·2	9,293·3	67	69·29	50·5	
		SUNDHIA.					
15th August 1914	3	2,960	7,800	55	36·52	81·05	
15th September ,,	5	3,440	9,120	54	57·31	60·02	
15th October ,,	6	2,080	5,440	63	70·04	29·8	
15th November ,,	5						Failed.
15th December ,,							,,
15th January 1915							,,
15th February ,,	8	3,279	8,680	70	90·18	36·3	
15th March ,,	7	6,132	16,200	53	80·27	76·5	
15th April ,,	9	7,132	18,840	54	76·41	94·9	
15th May ,,	7	9,412	25,240	54	63·27	148·9	
Average		4,919·3	13,045·9	57·6	67·71	75·2	

Date of Sowing.	No. of irrigations given.	Yield per acre in lbs.		Period of growth in days.	Cost of production per acre in Rs.	Cost of production in lbs. per rupee (dry).	Remarks.
		Dry.	Green.				
		KANG.					
15th August 1914	2	2,280	6,080	49	21·98	103·7	
15th September ,,	5	1,160	4,200	48	53·12	21·8	
15th October ,,	4	2,800	6,400	50	54·48	51·5	
15th November ,,	6	3,680	9,240	76	63·17	58·4	
15th December ,,	7	1,200	5,200	75	63·28	18·8	
15th January 1915	7	2,231	5,720	72	70·36	31·8	
15th February ,,	7	1,765	4,600	64	75·00	23·5	
15th March ,,	5	2,975	7,640	43	63·80	46·6	
15th April ,,	7	3,287	8,440	43	60·73	54·1	
15th May ,,	6	3,022	7,760	42	53·85	57·9	
Average		2,460	6,528	56·2	57·97	46·8	
		CHENO.					
15th August 1914	2	880	2,400	49	21·98	40·4	
15th September ,,	4	900	3,280	41	44·17	20·3	
15th October ,,	4	1,160	4,200	39	54·48	21·2	
15th November ,,	5	1,520	6,800	56	53·96	28·3	
15th December ,,	6	2,000	7,760	62	57·66	34·7	
15th January 1915	5	1,828	6,920	56	49·53	36·9	
15th February ,,	6	1,268	4,800	44	62·29	20·3	
15th March ,,	4	1,066	4,040	39	57·81	28·4	
15th April ,,	7	1,808	6,880	41	60·73	29·7	
15th May ,,	6	1,406	5,320	42	53·85	27·9	
Average		1,283·6	5,240	46·9	51·64	28·8	

Date of Sowing.	No. of irrigations given.	Yield per acre in lbs.		Period of growth in days.	Cost of production per acre in Rs.	Cost of production in lbs. per rupee (dr).	Remarks.
		Dry.	Green.				
		BANTI.					
15th August 1914	5	780	3,129	67	47·60	16·3	
15th September ,,	6	2,000	7,920	69	62·34	32·08	
15th October ,,	6	1,560	5,560	72	72·03	21·8	
15th November ,,	9	566	2,160	108	81·40	6·92	
15th December ,,	11	1,213	4,640	99	103·28	11·7	
15th January 1915	10	1,024	3,920	100	96.40	10·6	
15th February ,,	8	1,171	4,480	73	80·93	14·4	
15th March ,,	8	1,202	4,600	58	81·87	14·6	
15th April ,,	9	2,049	7,840	56	72·18	28·3	
15th May ,,	6						Failed.
Average		1,285	49,155	78	77·55	17·04	

Date of Sowing.	No. of irrigations given	Yield per acre in lbs. until 30th April.	No. of cuttings obtained.	Distribution of cuttings in days.	Cost of production in Rs. per acre.	Cost of production in lbs. (green) per Re.	Remarks.
			LUCERNE.				
15th August 1914	20	13,600	4	86, 53, 42, 29	175·4	77·5	Both these were resown on the 15th October as attempts to establish the crop in these months failed.
15th September ,,	20	13,600	4	87, 33, 42, 28	175·4	77·5	
15th October ,,	20	14,200	4	87, 42, 34, 27	175·4	80·9	
15th November ,,	17	15,080	3	104, 32, 30	168·5	89·5	
15th December ,,	15	11,200	2	110, 25	151·9	73·7	
15th January 1915	12	4,080	2	81, 24	128·6	31·8	
15th February ,,			Failed.				The seeds germinated well, but the young tender plants used to wither up and failed to make any progress.
15th March ,,			Failed.				
15th April ,,			Failed.				
15th May ,,			Failed.				

41. The conclusions which appear legitimate are—

(1) In the second half of the monsoon in the months of August and September the most useful crop to grow is sundhia jowar which, in the short period of 5 days, yielded at the rate of 3,440 lbs. of dry fodder (or 9,120 lbs. of green fodder per acre in the year under report, while in 1913-14 a yield of 6,760 lbs. of dry fodder (or 13,720 lb. of green fodder) per acre was obtained.

(2) In the Autum months maize is probably the most useful fodder to grow though it has not done very well in the year under report in 1913–14 however a crop sown in mid-December yielded 5,000 lbs. of dry fodder or 10,200 lbs. of green fodder per acre in 50 days.

(3) In the very cold months of January and February kang (Italicum setaria) seems as promising as any other cereal though perhaps oats or wheat might do better. In the year under report kang sown in mid-January has yielded at the rate of 2,231 lbs of dry (or 5,720 lbs. of green) fodder per acre in 72 days while last year it yielded at the rate of 4,400 lbs of dry fodder (or 9,000)of green fodder per acre.

(4) In the hot weather months of March to May sundhia is the most useful crop. One plot sown in mid-May yielded at the rate of 9,412 lbs. of dry fodder (or 25.240 lbs. of green fodder) in 54 days. However at the beginning of this season before the temperature has risen very high maize is also a very useful crop; a plot sown in mid-March yielded at the rate of 7,303 lbs. of dry fodder or 21,480 lbs. of green fodder per acre.

(5) Neither cheno (Panicum miliaceum), nor banti (Panicum crusgalli) have proved useful. The former, though maturing early, gives a very small outturn while the latter has too low and spreading a growth to make a useful cutting fodder while it is also a poor yielder.

(6) In the year under report lucerne did not do well. It suffered great damage from hares in addition to an attack of flea beetles, but it is clear that sowing this crop cannot be safely undertaken after mid-December while experience shows that sowing cannot be safely undertaken before October.

42. The second of the three stacks *of sundhia fodder, put up in January 1913, was opened and sold off in mid-July 1915 before the monsoon broke. The stack, therefore, stood for 2½ years during which time there were two monsoons. The recovery of good fodder was 84·2 per cent. The loss was due to shrinkage and there was no damage incurred from white-ants. This fodder was purchased in January 1913 at the rate of Rs 13-1-9 per 1,000 lbs. inclusive of stacking and thatching on an already prepared frame. The sale price was Rs. 25-12-8 per 1,000 lbs., but it is very important to point out that this sale was rendered possible solely by the delay in the setting in of the monsoon as the best offer up to the end of June was only Rs. 16 per 1,000 lbs. and no one was willing to purchase the whole stack of 20,000 lbs. odd. The reason for this was the appearance in the market at that time of the hot weather crop which was selling for Rs. 13 or Rs. 14 per 1,000 lbs. The following balance sheet will be of interest.

---

*The first stack was opened in June 1914, and the fodder was consumed on the Farm. It was found that there was a total loss of 12-6 per cent. made up of 9-8 per cent. of shrinkage and 2-8 per cent. of damaged stuff at the top of the stack. There was no damage from white-ants.

Expenditure.		Receipts.	
Purchase of 23,951 lbs. of sundhia fodder in January 1913 at Rs. 11-12-0 per 1,000 lbs.	281 6 9½	Sale of 20,160 lbs. of fodder in mid-July 1915 at Rs. 25-12-6 per 1,000 lbs.	520 0 0
Stacking and thatching charges.	41 4 7½		
Interest on Rs. 322-11-5 from 1st January 1913 to June 30th 1915 at 9 per cent. per annum.	29 0 8		
Balance gain	168-3-11		
	520-0-0		520-0-0

SECTION. II—MANURIAL EXPERIMENTS.

Experiment No. 1.

43. The experiment in which green manuring with and without supplementary mineral fertilizers under trial for tobacco was continued in the year under report with the results tabulated below. The san crop was slightly damaged by katras and was a little uneven. It was ploughed under in the middle of July when five weeks old and 3½ feet high. After an interval of 7 weeks the tobacco seedlings were planted by which time the san had completely rotted.

Plot No.	Manure.		Outturn per acre of cured leaf in lbs.	Value of produce per acre.	Cost of production per acre.	Cost per acre of the manures.	Remarks.
	Kind.	Quantity in lbs. per acre.					
	Original.			Rs. a. p.	Rs. a. p.	Rs. a. p.	
23A	G. M. of San + K_2SO_4 + Super Phosphate	21,600 + 200 + 300	1,080	67 8 0	89 12 6	43 8 8	
23B	G. M. of San	21,600	1,044	65 4 0	55 4 10	9 1 2	
23C	G. M. of San + K_2SO_4	21,600 + 200	960	60 0 0	73 4 0	27 0 2	
	Duplicate.						
34A	G. M. of San + K_2SO_4 + Super Phosphate	18,000 + 200 + 300	1,764	110 4 0	89 12 6	43 8 8	
34B	G. M. of San	18,000	1,824	114 0 0	55 4 10	9 1 2	
34C	G. M. of San + K_2SO_4	18,000 + 200	1,368	86 4 0	73 4 0	27 0 2	

44. It will be noted that there is no evidence to show that the mineral fertilizers have caused an increase in yield, although the outturns are very much higher than in the two previous years in spite of a set-back at the time of maturity by fog and rain and hence the cause of the comparatively low outturns on green manured plots cannot, as surmised in para. 61 of the 1912-13 Report, be attributed to the lack of mineral salts in the soil and the true explanation seems to lie in the insufficiency of organic matter.

Experiment No. 2.

45. This experiment is really part of experiment No. 1 and consists in a trial between growing tobacco in a two year rotation with kodra against continuous tobacco and in the former case a further comparison is made between green manure and farm yard manure.

The results obtained are tabulated in the following statement from which it will be seen that there is no comparison between these two treatments as the yields on the farm yard manure plots are enormously in advance of those on the green manured plots. The yeilds of tobacco on the green manured plots do not differ substantially in the continuous and rotated series and hence continuous tabacco is to be recommended as kodra leaves less profit than tobacco.

Plot No.	Area in gunthas.	Crop.	Tillage.	Manure.		Outturn of cured leaf in lbs. per acre.	Value of produce per acre.	Cost of production per acre.	Rotation to the tobacco crop.	Remarks.
				Kind.	Quantity per acre in lbs.					
							Rs. a. p.	Rs. a. p.		
25	10	Tobacco	Deep	Green manure of San	18,360	1,460	91 4 0	55 4 10	Kodra Mixture.	
36	10	Do.	Do.	Do.	14,400	1,076	67 4 0	55 4 10		
27	10	Do.	Ordinary	Farm yard manure	30,000	2,212	144 8 0	84 15 6		
8	10	Do.	Do.	Do.	Do.	1,976	123 8 0	88 7 6		

46. In para. 45 of last year's Report it was pointed out that there was a patch of about 2 gunthas in plot 36 where the kodra plants withered up. It was noted in the season under report that the tobacco plants on the same patch were similarly affected which supports the view of the Economic Botanist that there was something wrong physically with the soil.

47. The results obtained with kodra on the rotation plots are tabulated below from which it will be seen that more produce is obtained after farm yard manure than after san, but the crop became stunted on account of the wet weather in July and subsequently kodra suffered badly from drought while til was seriously damaged by top shoot roller.

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ORDINARY PLOUGHING.

Plot No.	Crop.	Yield per acre in lbs.		Value of produce per acre.	Cost of production per acre.	Residual Manure.
		Grain.	Fodder.			
				Rs. a. p.	Rs. a. p.	
24	Kodra	648	1,724	43 6 6	21 8 0	Green Manure of San.
	Tal	21				
	Tur	212	292			
	Sheria	232	63 (fibre)			
26	Kodra	580	1,548	52 13 6	21 8 0	Farm Yard Manure.
	Tal	19				
	Tur	488	724			
	Sheria	190	48 (fibre)			

DEEP PLOUGHING.

Plot No.	Crop.	Yield per acre in lbs.		Value of produce per acre.	Cost of production per acre.	Residual Manure.
		Grain.	Fodder.			
				Rs. a. p.	Rs. a. p.	
35	Kodra	696	1,844	37 11 0	24 8 0	Green Manure of San.
	Tal	7				
	Tur	292	496			
	Sheria	136	48 (fibre).			
37	Kodra	616	1,628	39 8 10	24 8 0	Farm Yard Manure.
	Tal	13				
	Tur	256	416			
	Sheria	120	44 (fibre).			

Experiment No. 3.

48. The experiment in which the value of several cake manures as supplementary to a dressing of farm yard manure is investigated was continued in the year under report. The results obtained in the year under report are tabulated below from which it will be seen that all the cakes have materially increased the outturn but only castor cake has enhanced the nett profits which is fortunate as this is the only cake locally available.

No. of plot.	Special manurial treatment per acre in addition to 20,000 lbs. F. Y. M.		Yield of cured leaf per acre in lbs.	Value of produce per acre.	Cost of production per acre.	Nett profit per acre.	Remarks.
	1,000 lbs. of	Cost in					
		Rs. a. p.		Rs. a. p.	Rs. a. p.	Rs. a. p.	
88-B	Nil		1,720	107 8 0	77 11 6	29 12 6	
87-A	Castor-cake	20 0 0	2,340	146 4 0	99 0 10	47 3 2	
88-A	Cotton-seed cake	25 0 0	1,998	124 14 0	104 0 10	20 13 2	
87-B	Groundnut cake	33 5 4	2,172	135 12 0	112 6 2	23 5 10	

49. This experiment has been conducted for five years and it will, therefore, be useful to summarize the results obtained. This is done in the following statement from which it will be seen that 1,000 lbs. of castor cake has increased the outturn by 36 per cent. and the nett profits by 70 per cent. This result has been obtained with castor cake costing 45¾ lbs. per rupee. Cotton seed cake and groundnut cake were purchased at the rates of 36½ lbs. and 29⅓ lbs. per rupee respectively while safflower cake cost 34⅙ lbs. per rupee.

Name of manure.	Quantity of manure per acre in lbs.	Outturn of cured leaf per acre in the year.						Average in Rs. per acre.			Remarks.
		1909-10.	1910-11.	1912-13.	1913-14.	1914-15.	Average.	Value of produce.	Cost of production.	Net profits.	
								Rs. a. p.	Rs. a. p.	Rs. a. p.	
Farm yard manure	20,000	2,032	1,560	1,568	1,040	1,720	1,584	124 7 7	92 12 6	31 11 1	
Farm yard manure+castor cake	20,000 + 1,000	2,344	1,824	2,696	1,576	2,340	2,156	169 13 2	115 12 3	54 0 11	
Farm yard manure+cotton seed cake	20,000 + 1,000	2,464	1,672	2,032	1,456	1,998	1,924½	150 15 1	121 6 1	29 9 0	
Farm yard manure + groundnut cake	20,000 + 1,000			2,256	1,600	2,172	2,009	152 5 4	121 12 5	30 8 11	This cake was used in 1912-13, 1913-14 & 1914-15.
Farm yard manure+safflower cake	20,000 + 1,000	2,378	1,784				2,081	179 12 0	131·13 4	47 14 8	This cake was used in 1909-10 & 1910-11.

50. Safflower cake has also done well in the two years in which it was used increasing the nett profits by over 50 per cent. but it is not locally available.

Experiment No. 4.

51. In para. 6 of 1910-11 Report the general scheme of a qualitative manurial experiment upon tobacco was described. The effect of the various artificials upon the composition of the leaf has been described elsewhere, *vide* para. 9 above, but it will be of interest to give the outturn figures here. In the year under report, owing to the unfavourable weather conditions at the time of planting, many gaps had to be filled in from time to time which resulted in an uneven growth and patches occurred on the borders and in the centre of the area of the experiment. The results obtained in the year under report are summarized in the following three statements.

52. Statement I gives the yield of each individual plot. Statement II compares the yields of plots manured with potash in various ways. Statement III compares the yields of plots receiving potash alone and potash supplemented with other artificials.

STATEMENT I.

Potash per acre.	Yield of cured leaf per acre by addition of artificial manures.					
	Original.			Duplicate.		
	300 lbs superphosphate per acre.	Nil.	300 lbs. superphosphate and 200 lbs. sodium nitrate per acre.	300 lbs. superphosphate per acre.	Nil.	300 lbs. superphosphate and 200 lbs. sodium nitrate.
	Plot No. 45.			*Plot No. 53.*		
	a	*b*	*c*	*a*	*b*	*c*
100 lbs. K_2O in Potassium Sulphate	1,086	1,074	1,620	1,296	1,080	1,224
	d	*e*	*f*	*d*	*e*	*f*
100 lbs. K_2O in wood ashes	1,224	1,884	1,440	1,296	1,440	1,386
	Plot No. 47.			*Plot No. 55.*		
	a	*b*	*c*	*a*	*b*	*c*
50 lbs. K_2O in Potassuim sulphate	1,728	1,422	1,476	1,428	900	1,512
	d	*e*	*f*	*d*	*e*	*f*
50 lbs. K_2O in wood ashes	1,602	1,884	1,656	1,350	1,026	1,476
	Plot No. 46.			*Plot No. 54.*		
	a	*b*	*c*	*a*	*b*	*c*
No Potash	1,044	864	1,224	1,428	1,080	1,332
	d	*e*	*f*	*d*	*e*	*f*
No Potash	1,296	1,332	1,440	1,314	1,404	1,656

STATEMENT II.

Name of manure.	Quantity of manure applied.					
	100 lbs. K_2O.			60 lbs. K_2O.		
	Yield of cured leaf in lbs. per acre.			Yield of cured leaf in lbs. per acre.		
	Original.	Duplicate.	Average.	Original.	Duplicate.	Average.
Sulphate of Potash ...	1,460	1,500	1,480	1,542	1,280	1,411
Wood ashes ...	1,516	1,374	1,445	1,714	1,284	1,499
Nil ...	1,044	1,280	1,162	1,356	1,458	1,407

STATEMENT III.

Manurial treatment per acre.		Sulphate of Potash.				Wood Ashes.			
Potash K_2O.	Additional treatment.	Original plot.	Duplicate Plot.	Average.	Average of both large and small dressings.	Original plot.	Duplicate plot.	Average.	Average of both large and small dressings.
100 lbs.		1674	1080	1377		1884	1440	1662	
50 lbs.		1422	900	1161		1884	1026	1455	
Average		1548	990		1269	1884	1233		1558½
100 lbs.	300 lbs. of Superphosphate	1086	1296	1191		1224	1296	1260	
50 lbs.		1728	1428	1578		1602	1350	1476	
Average		1407	1362		1384½	1413	1323		1368
100 lbs.	300 lbs. Superphosphate + 200 lbs. Sodium Nitrate	1620	1224	1422		1440	1386	1413	
50 lbs.		1476	1512	1494		1656	1476	1566	
Average		1548	1368		1458	1548	1431		1489½

53. These results suggest 50 lbs. of Potash whether in Sulphate of Potash or wood ashes have not greatly influenced the yield. 100 lbs. on the other hand does seem to have materially increased the outturn. The addition of Superphosphate and Sodium Nitrate cannot be said to have influenced the yield materially.

Experiment No. 5.

54. The experiment in which equal weights of urine earth and cattle dung are compared was repeated in the year under report upon the bajri crop. The results obtained in the season under report are tabulated below from which it will be seen that dung has given an excess of 400 lbs. of total dry matter over urine earth. This experiment has been conducted for four years in three of which dung has proved superior to urine earth, but the composition of urine earth is a variable factor depending upon the amount of earth used :—

Plot No.		Kind of manure.	Yield in lbs. per acre.				Average total dry matter in lbs. per acre.	Remarks.
			Original . plots.		Duplicate plots.			
Original.	Duplicate.		Grain.	Fodder.	Grain.	Fodder.		
116	120	Urine earth	484	2228	226	1008	1,973	
118	122A	Dung	512	2416	301	1525	2,377	

55. The experiment in which Nitre is applied to paddy was seriously interfered with owing to the drought in August, but the crop receiving 80 lbs. of Nitre per acre in addition to the common dressing of 20,000 lbs. of farm yard manure yielded 400 to 500 lbs. of grain per acre more than the control plots, but Nitre is a costly fertilizer and there was no appriciable increase in net profits.

Dhola wheat was grown on the area of this experiment in the rabi season, but was destroyed by the severe attack of rust and smut while birds also did much damage.

56. The experiment in which efforts are being made to make the soil of this farm suitable for potato cultivation was vitiated in the year under report owing to the seed obtained from Dharwar failing to germinate. The area was resown with fresh Italian seed received from Bombay, but the crop did not make good progress perhaps owing to the land having been twice watered in connection with the first planting. The actual results are summarized in Appendix XII.

57. The rotation plots of potatoes were sown with bajri mixture and owing to the high condition of the land the bajri crop grew very luxuriantly and smothered the subsidiary crops. The bajri stalks became very coarse. The results obtained are tabulated below from which it will be seen that high profits were obtained and that the crop grown on the residue of green manure plus artificials was heavier than that grown on the residue of farm yard manure.

Original Plots.

Plot No.	Previous manurial treatment.		Crop.	Yield per acre in lbs.		Value of Produce per acre.	Cost of production per acre.	Remarks.
	Kind.	Quantity per acre in lbs.		Grain.	Bye Product.			
		lbs.				Rs. a. p.	Rs. a. p.	
51 A	San ploughed in + K_2SO_4 + Super Phosphate	16,960 100 200	Bajri	1,344	6,680	81 1 10½	19 12 0	The mixture crop of pulses—math, mug and tur failed owing to very vigorous and rank growth of bajri stalks.
51 B	Farm yard manure	20,000		1,250	6,520	76 1 4	19 12 0	Do.

Duplicate Plots.

		lbs.				Rs. a. p.	Rs. a. p.	
59 A	San ploughed in + K_2SO_4 + Super Phosphate	16,960 100 200	Bajri	1,176	5,296	69 13 4	19 12 0	The mixture crop of pulses failed as above noted.
59 B	Farm yard manure	20,000		912*	4,456	54 14 1½	19 12 0	Do.

* On the Western portion about ¼ guntha got water-logged and the young plants rotted which reduced the yield.

SECTION III.—CULTURAL EXPERIMENTS.

Experiment No. 1.

58. In this experiment the advantage or otherwise of fair season cultivation for the commonly cultivated kharif crops of northern Guzerat is under investigation. The rotation adopted is a three year one consisting of bajri mixture, kodra mixture and sundia. Formerly the stubble of all these crops was disc ploughed in the month of March or April but a change was introduced in the year under report. Of the three crops mentioned above sundhia alone is grown as a pure crop and hence the land is accessible in November, while in the case of bajri and kodra the subsidiary pulse crops occupy the land for several months after the main crops are harvested. It was, therefore, decided to restrict the fair season cultivation to once in three years and to carry it out after the sundhia crop, by first discing the sundia stubble in the month of November and then ploughing with a gallow plough in the hot weather, an operation rendered possible by the previous discing.

In the season under report the discing was done in November and the ploughing (with a gallows plough) was done in April and bajri mixture was sown in the monsoon. But unfortunately the season was a bad one for bajri, while the subsidiary pulses were severely damaged by rats. The results are, therefore, of no value for comparative purposes and are not published.

Experiment No. 2.

59. The experiment designed to test the relative value of planting one or more paddy seedlings at each place was continued in the year under report and the results obtained are tabulated below from which it will be seen that one seedling is not sufficient while two seedlings have given a larger outturn than three seedlings.

No. of seedlings planted at one place.	Yield per acre in lbs.		Value of produce per acre.	Cost of production per acre.
	Grain.	Straw.		
			Rs. a. p.	Rs. a. p.
One seedling	2,340	4,217	81 9 0	60 12 6
Two seedlings	3,023½	4,062	102 9 9	60 12 6
Three seedlings	2,795	5,397	96 2 1	60 12 6

60. This experiment has now been conducted for six years and it will be useful to summarize the results obtained in the following statement from which it will be seen that at least two seedlings are required while three seedlings show no advantage over two except in straw outturn.

Average results in lbs. per acre of one, two and three seedlings of paddy planted at one place.

Number of seedlings.	1908-09.		1909-10.		1910-11.		1912-13.		1913-14.		1914-15.		Total.		Average.		Remarks.
	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	
One seedling	745	1490	1362	1554	1895	2213	2957	6300	1774	1157	2340	4217	11073	16931	1845½	2822	
Two seedlings	1365	2708	1991	2233	2030	2357	2933	6521	2256	1286	3023½	4062	13598½	19167	2266½	3194½	
Three seedlings	1557	2709	2005	2538	2112	2432	2987	6570	2069	1067	2795	5397	13525	20713	2254	3452	

Experiment No. 2.

61. In this experiment bajri and kodra mixture grown continuously are compared with the same mixtures grown in roation with one another. The results obtained in the year under report are tabulated below from which it will be seen that the rotated crops have done better than the continuous crops in the year under Report :—

Group of plots.	Rotation.	No. of plots.	Crops.	Yield per acre in lbs.		Value of produce per acre.	Cost of production per acre.
				Grain.	Fodder.		
						Rs. a. p.	Rs. a. p.
I	Continuous bajri mixture	137	Bajri	200	930	28 0 6	25 10 7½
			Math	30	490		
			Mag	140	1,490		
			Tur	25	180		
II	Bajri mixture and kodra mixture in rotation	138	Bajri	220	1,100	34 8 0	25 10 7½
			Math	25	360		
			Mag	260	1,580		
			Tur	15	150		
		139	Kodra	544	1,304	37 3 4	26 8 6
			Tal	18			
			Tur	144	280		
			Sheria	224	Fibre 80		
III	Continuous kodra mixture	140	Kodra	352	840	24 4 10	26 8 6
			Tal	4			
			Tur	56	136		
			Sheria	216	Fibre 64		

Experiment No. 3.

62. This experiment was started in 1913-14 with the object of ascertaining whether a crop of cotton once in two years could be profitably taken on land otherwise given up to continuous tobacco. It was anticipated that the high state of fertility induced by the cultivation of tobacco would result in an enormous crop of cotton at a comparatively small cost.

The results obtained in the past two seasons are tabulated below but the experiment has been interferred with in two ways. In both seasons the tobacco crop has been much below normal due to stem-borer (Gnorimoschima beliopa) in 1913-14 and unseasonal rains in 1914-15 which were very heavy in the beginning of the season causing the loss of two or three bottom leaves, while the rain at harvest time materially reduced the outturn of cured leaf. The second factor was the price of cotton in 1914-15 which fell much below normal owing to the War. Cambodia was the variety of cotton grown and was badly attacked by aphides (in 1914-15) but after making allowances for this, the outturns have not come up to expectations and no definite conclusion can be drawn.

It may be noted however that in both seasons the cotton crop was very vigorous but suffered much from 'wilt' while leaf rollers and aphides severely destroyed the crop in both seasons :—

Plot No.	Area of plots in acres.	Yield per acre in lbs.		Average value of produce per acre in Rs.		Average cost of production per acre in Rs.	
		Cured leaf of tobacoo.	Seed-cotton.				
2A to 5A	½	1,172 (1914-15)	743½ (1913-14)	69 11 3 C 73 4 0 T	71 7 7½	45 6 6 C 93 11 9 T	71 1 1½
2B to 5B	½	963 (1913-14)	665½ (1914-15)	51 15 10½ C 75 2 6 T	63 9 2¼	46 5 6 C 95 11 4 T	71 0 5
13 to 16	1	1,132¼ (1913-14) 1,452 (1914-15) 1,292		88 7 4 T 90 12 0 T	89 9 8	96 15 11 T 102 10 7 T	99 13 3

SECTION IV—ROTATIONAL EXPERIMENTS.

Experiment No. 1.

63. This experiment which consists of a comparative trial between growing crops mixed and pure was repeated in the year under report. The results are tabulated in the following statement from which it will be seen that the outturns were very poor owing to the unfavourable season for both bajri and kodra. Nevertheless in all cases the mixed crops have given greater gross returns in cash than the pure crops, a result which is in agreement with results obtained in previous years and we may therefore conclude that the local practice of mixed cropping is sound as it enables those crops which suit the vagaries of any particular season to take advantage of the whole area instead of only a fraction of it. The only disadvantage associated with this practice is the fact that the land remains occupied far into the fair season thus preventing any preparatory tillage for the next season :—

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Plot No.	Crop.	Crops grown pure.				Remarks.	Plot No.	Crop.	Crops grown mixed.				Remarks.
		Yield per acre in lbs.		Value of produce per acre.	Cost of production per acre.				Yield per acre in lbs.		Value of produce per acre.	Cost of production per acre.	
		Principal prodnct.	Bye product.						Principal o duct.	Bye product.			
				Rs. a. p.	Rs. a. p.						Rs. a. p.	Rs a. p.	
44	Bajri	110	576	17 15 ½	28 13 2		33	Bajri	228	1,028	30 7 2	28 13 2	
	Math	134	620					Math	·30	604			
	Mag	6	156					Mag	76	844			
	Tur	62	120					Tur	140	272			
42	Kodra	245	562	16 12 9	24 6 0		31	Kodra	352	812	26 5 10	24 6 0	
	Tal	7						Tal	8	204			
	Tur	132	288					Tur	204	336			
	Sheria	45	Fibre 10					Sheria	98	Fibre 28			
43	Bavto	293	557	37 5 8½	24 4 0		32	Bavto	736	1,388	62 3 8	24 4 0	
	Castor	284						Castor	132				
	Val	6	4 (293 lbs. green pods)					Val	144	68 (594 lbs. green pods)			

Miscellaneous.

64. According to Government Resolution No, 8241, dated 20th August 1907, four plots were set aside to compare the yields of bajri and kodra mixture when treated according to the ordinary local practice * with those when land is well manured.

The season interfered with the action of the manures preventing the yields on the well manured plots reaching the figures they should have done and hence the profits on the well manured plots are not greater than on the other plots. All the crops were poor amounting to 4 annas only :—

Plot No.	Treatment.	Crop.	Yield per acre in lbs.		Value of produce per acre.			Cost of production per acre.		
			Grain.	Fodder.	Rs	a.	p.	Rs.	a.	p.
123A	No manure	Bajri	320	1,891	19	15	0	18	4	0
123B	F. Y. M. 15,000 lbs. per acre	Do.	460	2,472	28	2	5	34	6	0
124A	No manure	Kodra	201	480	32	5	9½	21	12	4
		Tal	100½							
		Tur	205	435						
		Sheria	160	Fibre 45						
124B	F. Y. M. 15,000 lbs. per acre	Kodra	292	728	39	8	8	37	14	4
		Tal	118							
		Tur	240	436						
		Sheria	168	Fibre 60						

65. The following is a list of Appendices to this report :—

- I. Labour rates and prices of produce sold,
- II. Analyses and prices (inclusive of freight) of manures used,
- III. Prices of food stuffs used,
- IV. Analyses of the water of Farm well used for irrigation purposes,
- V. Quantities of irrigation water applied to various crops,
- VI. Comparison between Farm and cultivators' crops during 1914-1915 (*vide* G R No 8241 dated 20th August 1907),
- VII Statement showing the distribution of seeds, implements and manures,

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* The treatment of plots 123A and 124A has been rather below the average as no manure has been applied since 1905-1906.

VIII. Enquiries,

XI. List of visitors,

X. Statement recording the results of selection for spikelets in—
  (*a*) Dhola wheat,
  (*b*) Popatia,

XI. Statement recording the results of selection for tillering in—
  (*a*) Dhola wheat,
  (*b*) Popatia,

XII. Statement showing the yield of potatoes referred to in para. 53 of the report,

XIII. Analyses of leaf of the tobacco varieties,

XIV. Analyses of the guvar varieties.

APPENDIX I.

Labour rates and prices of produce sold.

Name.	Rate.	Per
Labour.	Rs. a. p.	
Male	0 4 6	head.
Female	0 2 6	,,
Boy	0 1 6	,,
Bullock	0 6 0	,,
Carpenter	1 0 0	,,
Mason	0 14 0	,,
Farm produce.		
Grain—		
Bajri	2 0 0	per maund of 40 lbs.
Sundhia jowar	2 8 0	,,
Kodra	1 2 0	,,
Rice	1 5 0	,,
Bavto	1 9 0	,,
Cotton	3 2 0	,,
Wheat	2 4 0	,,
Castors	2 8 0	,,
Wheat	2 12 0	,,
Fodder—		
Jowar	1 0 0	100 lbs.
Bajri	1 0 0	480 lbs.
Kodra	1 0 0	500 lbs.

APPENDIX II.

Analyses and prices (inclusive of freight) of manures used.

Name of manure.	Analyses.			Rate per Rupee in lbs.	Remarks.
	Nitrogen.	Potash.	Phosphoric acid.		
Caster cake	6·97			50	
Groundnut cake	7·26			30	
Cotton-seed cake	5·52			40	
Farm yard manure	1·35			1,000	
Urine earth	0·18			1,000	
Wood-ashes		3·53		800	
Superphosphate			12·67	21	
Sodium Nitrate	16·24			7¼	97·57 % purity.
Nitre	12·50	41·96		6½	90·18 % ,,
Potassium Sulphate		22·90		13$\frac{7}{16}$	42·57 % ,,

APPENDIX III.

Prices of Food-stuffs used.

Name.	Rate.			Per
	Maximum.	Minimum.	Average.	
	Rs. a. p.	Rs. a. p.	Rs. a. p.	lbs.
Guvar	1 13 0	1 9 6	1 10 9	40
Sundhia fodder	1 0 0	1 0 0	1 0 0	100
Bajri ,,	1 0 0	1 0 0	1 0 0	300
Lucerne	1 0 0	1 0 0	1 0 0	100

APPENDIX IV.

Analysis of the Water of the Farm well used for irrigation purposes.

Name of Salt.	Parts per 100,000 analysed in		
	May	October.	Average.
Calcium carbonate	10·00	10·00	10·00
Magnesium carbonate	25·76	33·49	29·62
Sodium bicarbonate	16·35	8.68	12·52
Do. sulphate	13·40	15·86	14·63
Do. chloride	68·90	59·40	64·15
Do. carbonate		1·06	1·06
Total Salts	142·00	132.00	137·00

APPENDIX V.

Quantities of irrigation Water applied to various crops.

Crop.	Quantity of water at the time of sowing in c. ft.	Quantity of water at the time of 1st watering in c. ft	Quantity of water at the time of 2nd watering in c. ft.	Total No. of waterings.	Total quantity of water applied.		Rainfall during the period in inches.	Total quantity of water in inches.	Remarks.
					In c. ft.	In inches.			
Tobacco	3,990	5,052½	7874½	4	21,906½	6·11	5·77	11·88	
Wheat	17,890	8,952	6,380	7	63,593	17·74	0·00	17·74	
Potatoes	12,936	8,100	8,250	9	78,156	21·79	0·00	21·79	
Rice		18,992		1	18,992	5·30	19·97	25·27	

APPENDIX VI.

Comparison between Farm and cultivators' crops during the year 1914-15.

(Vide *G. R. No. 8241, dated 20th August 1907.*)

Name of place.	Crop.	Yield per acre in lbs.		Remarks.
		Farm's	Cultivators'	
	Bajri mixture.			
Farm *vs.* Kamla village.	Bajri grain	864¾	641	
	Do. fodder	4,160	3,825	
	Math	53¼	Failed	
	Mag	128		
	Tuer	46¼	128¾	
	Guvar		205	
	Kodra mixture.			
Do.	Kodra grain	292	246	
	Do. fodder	728	400	
	Tal	118	164	
	Tuer	240	273	
	Sheria grain	168		
	Do. Fibre	60		
Farm *vs.* Manjipura village.	Sundhia grain	244	308	
	Do. fodder	3,128	3,400	

APPENDIX VII.

STATEMENT SHOWING THE DISTRIBUTION OF SEEDS IMPLEMENTS AND MANURES.

Seeds.

Name of seed.	Quantity in lbs.	Name of seed.	Quantity in lbs.
Bajri varieties	154½	Popatia wheat	180
Sundhia Jowar	200	Kodra	2
Sherio	20	Bavto	1
Castor varieties	85	Cheno	1
Groundnut	220	Bavti	1
Tur varieties	10¼	Kang	1
Chillis' seed	5	Cotton seeds of varieties	384¼
Mag	1½	Tabacco seeds	8¾
Math	1	Cambodia cotton seed	48
Chola	2	Guvar varieties	4
Udid	1	Jiru	14
Wal	2	San seed	2
Basmati rice	30	Safflower	½
Variali	2	Vegetable and flower seeds	Small Quantity.
Wheat	2		

Implements.

Name of District.	Name of Taluka.	Ploughs.			Spare parts.		
					Shares.		Monsoon Share pins and shares.
		B. T.	I. N. D	Monsoon.	B. T.	I.N.D	
Ahmedabad	Daskroi	3	13	9	11	12	41
	Dholka	2	6			12	
	Sanand	1					
	Prantij	1			4		
Kaira	Nadiad	3		1	2		2
	Kapadwanj	1					
	Anand	2	1	1			
	Matar	1					
Panch Mahals	Kalol	1		2			
Other places		3					
	Total	18	20	13	17	24	43

In addition to this one Raja, and one Arlington plough were sold, also a few iron chains and some seed bows.

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APPENDIX VIII.

Enquiries.

Enquiries were received regarding the cultivation of cotton Cambodia and Bourbon, bajri, jowar, rape, chillis and potatoes, spanish peanut, san for green manuring, farming in general on a large scale, fruit and flower culture and tobacco cultivation and its manufacture. There were many enquiries for iron ploughs for Goradu and black soils, hand hoes, hand pump, clod crusher and steam plough. Remedial measures were also asked for rats and white-ants. But the greater number of these enquiries were addressed in person especially regarding the B. T. plough and other iron ploughs. These enquiries were duly replied to by the Superintendent.

APPENDIX IX.

List of visitors.

	Cultivators.	Govt. Servants.	Others.	Total.
From 1st April to 30th June 1914	100	6	12	118
From 1st July to 30th September 1914	36	2	9	47
From 1st October to 31st December 1914	66	2	17	85
From 1st January to 31st March 1915	59	4	14	77
Total	261	14	52	327

APPENDIX X.

STATEMENT RECORDING THE RESULTS OF SELECTION FOR SPIKELETS.

(a) *Dhola wheat.*

Row No.	Details of the whole row (as ascertained from 10 plants taken at random).				Actual yield in oz.	Details of the selected plant (obtained from the 10 best plants as judged by the eye).*			
	Average.		Product of cols. 2 and 3.	Weight of 100 average grains in grains.		Average No. of spikelets per ear-head.	No. of culms (*i.e.* tillers).	Product of cols. 7 and 8.	Weight of 100 average grains in grains.
	No. of spikelets per ear-head.	No. of culms (*i.e.* tillers) per plant.							
1	2	3	4	5	6	7	8	9	10
1					3·7				
2	18	8	144	62	2·2	18	11	198	64
3					3·6				
4	17·48	8·2	143·5	64	4·0	17·7	10	177	64·6
5					3·2				
6	17·8	8	142·4	63·9	4·2	18·6	9	167·4	64·5
7					5·3				
8	17·6	8·4	147·8	62·3	2·9	17·6	12	211·2	64·5
9					4·8				
10	17·6	5·2	91·5	67	3·6	17·8	6	106·8	70

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* In the year under report these data were obtained from the 5 best plants as judged by the eye.

APPENDIX X—*contd.*

STATEMENT RECORDING THE RESULTS OF SELECTION FOR SPIKELETS—*contd.*

(*a*) *Dhola wheat*—contd.

Row No.	Details of the whole row (as ascertained from 10 plants taken at random).				Actual yield in ozs.	Details of the Selected plant (obtained from the 10 best plants as judged by the eye).*			
	Average.		Product of cols. 2 and 3	Weight of 100 average grains in grains.		Average No. of Spikelets per ear-head.	No. of culms. (*i.e.* tillers).	Product of cols. 7 and 8.	Weight of 100 average grains in grains.
	No. of Spikelets per ear-head.	No. of culms (*i.e.* tillers) per plant.							
1	2	3	4	5	6	7	8	9	10
11					4·9				
12	Rejected and new plant substituted.					17·55	21	368·5	66
13					4·3				
14	16·6	7·8	129·5	72	3·9	17·14	9	154·2	73
15					2·5				
16	17·2	8·8	151·36	68·4	2·6	17·3	12	207·6	73
17					5·1				
18	17·15	9·4	161·2	68	2·5	17·6	13	228·8	70
19					3·8				
20	16·72	7·6	127	68·8	2·4	17·4	8	139·2	71
21					2·4				
22	17	8·4	142·8	68·2	3·4	17·5	10	175	71
23					2·3				
24	16·9	10·8	182·5	63·8	3·0	18	12	216	64
25					3·0				
26	17·08	10·6	181	64·4	3·4	17·1	14	239·4	66
27					2·9				
28	16·8	8·6	144·5	66·8	2·5	17·57	14	246	68
29					3·5				
30	16·1	12	193·2	64	4·3	16·6	15	249	64
31					2·5				
32	16·8	8·4	141·1	66·8	3·7	17·25	9	155·29	68

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* In the year under report these data were obtained from the 5 best plants as judged by the eye.

APPENDIX X—*contd.*

STATEMENT RECORDING THE RESULTS OF SELECTION FOR SPIKELETS—*contd.*

(*a*) *Dhola wheat*—contd.

Row No.	Details of the whole row (as ascertained from 10 plants taken at random).				Actual yield in oz.	Details of the Selected plant (obtained from the 10 best plants as judged by the eye).*			
	Average.								
	No. of Spikelets per ear-head.	No. of culms (*i.e.*, tillers) per plant.	Product of columns 2 and 3.	Weight of 100 average grains in grains.		Average No. of Spikelets per ear-head.	No. of culms. (*i.e.*, tillers).	Product of cols. 7 and 8.	Weight of 100 average grains in grains.
1	2	3	4	5	6	7	8	9	10
33					2·9				
34	16·21	6·8	110·2	70·0	3·8	16·70	8	133·60	70
35					3·6				
36	16·22	10·2	165·4	64·2	3·5	16·33	10	163·3	68
37					4·9				
38	15·80	11·60	183·3	67	5·1	16·55	12	198 6	68
39					4·85				
40	15·60	13	202·8	69·6	4·34	16·90	15	253·5	72
41					4·4				
42	16·4	9	147·6	72	4·1	17·08	12	204·96	72
43					4·2				
44	16·14	9·6	154·9	71·8	3·55	16·4	9	147·6	76
45					4 5				
46	16·76	12·0	201·12	67·6	4·2	16·90	17	287·3	68
47					4·33				
48	16·9	8·8	148·7	68·4	4·10	17·1	10	171	72
49					4·5				
50	16·79	10·6	177·97	58·4	2·4	16·8	14	235·2	63
51					4·55				
52	17·36	8	138·88	62·6	4·6	16·5	8	132·0	65
53					5·0				
54	17·15	8·2	140·6	68·4	3·8	17·4	9	156·6	72

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* In the year under report these data were obtained from the 5 best plants as judged by the eye.

APPENDIX X—*contd.*

STATEMENT RECORDING THE RESULTS OF SELECTION FOR SPIKELETS—*contd.*

(a) Dhola wheat—concld.

Row No.	Details of the whole row (as ascertained from 10 plants taken at random).				Actual yield in oz.	Details of the Selected plant (obtained from the 10 best plants as judged by the eye).*			
	Average.		Product of cols. 2 and 3.	Weight of 100 average grains in grains.		Average No. of Spikelets per ear-head.	No. of culms (*i.e.* tillers).	Product of cols. 7 and 8.	Weight of 100 average grains in grains.
	No. of Spikelets per ear-head.	No. of culms (*i.e.*, tillers) per plant.							
1	2	3	4	5	6	7	8	9	10
55					4·5				
56	17·39	10·8	187·8	63	3·9	17·95	22	394·9	63
57					3·8				
58	17·0	9·4	169·8	61	4·0	17·6	13	228·8	60
59					4·2				
60	17·3	6·8	117·64	66·6	2·2	17·6	7	123·2	70
61					4·66				
62	17·3	11·2	193·76	59·8	2·4	17·31	13	205·03	60
63					4·3				
64	18·06	9·2	166·1	63·9	3·0	18·75	10	187·5	65
65					4·0				
66	16·5	8·6	141·9	59	3·4	17·1	9	153·9	65
67					3·2				
68	16·78	9·6	161·08	64·2	3·3	17	11	187	68
69					3·5				
70	16·7	7·8	130·26	64	3·25	17·3	8	138·4	66
71					4·0				
72	16·66	9·0	149·94	64·2	5·1	16·44	10	164·4	68
73					3·7				
74	17·8	10	178	63·8	4·25	18·11	9	162·99	69
75					4·68				
76	16·66	7·8	129·95	61·1	4·15	16·33	12	195·96	64
77					3·2				
78	16·84	13·6	229	67	4·9	17·26	17	362·4	68

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* In the year under report these data were obtained from the 5 best plants as judged by the eye.

APPENDIX X—*contd.*

STATEMENT RECORDING THE RESULTS OF SELECTION FOR SPIKELETS—*contd.*

(*b*) *Popatia.*

Row No.	Details of the whole row (as ascertained from 10 plants taken at random).				Actual yield in oz.	Details of the Selected plant (obtained from the 10 best plants as judged by the eye).*			
	Average.		Product of cols. 2 and 3.	Weight of 100 average grains in grains.		Average No. of Spikelets per ear-head.	No. of culms (*i.e.* tillers).	Product of cols. 7 and 8.	Weight of 100 average grains in grains.
	No. of Spikelets per ear-head.	No. of culms (*i.e.*, tillers) per plant.							
1	2	3	4	5	6	7	8	9	10
1					7·6				
2	24·34	7·8	189·9	56·6	3·7	24·25	8	194	60
3					3·7				
4	25·6	6·6	169	49·4	3·5	26·1	8	208·8	60
5					4·4				
6	25·12	8·6	216	63·2	4·4	25·7	9	231·3	67
7					4·5				
8	24·6	8·2	201·7	63·4	3·6	24·75	8	198	70
9					4·0				
10	23·9	6·2	148·18	58·8	3·5	24·5	7	171·5	61
11					4·2				
12	24·5	8·4	205·8	57·2	3·9	25·6	10	256	60
13					3·1				
14	25·02	7	175·14	52·4	4·0	26·2	8	209·6	56
15					3·6				
16	25·18	8·5	214·03	58	4·0	25·3	11	278·3	62
17					4·9				
18	24·7	8·2	202·54	55·6	5·0	25·3	14	354·2	59
19					4·0				
20	24·7	6·8	167·96	56·8	3·6	25·8	7	180·16	57
21					4·0				
22	24·5	6·2	151·9	56·8	4·0	24·8	8	198·4	60

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* In the year under report these data were obtained from the 5 best plants as judged by the eye.

APPENDIX X—*contd.*

STATEMENT RECORDING THE RESULTS OF SELECTION FOR SPIKELETS—*contd.*

(*b*) *Popatia*—contd.

Row No.	Details of the whole row (as ascertained from 10 plants taken at random.)				Actual yield in oz.	Details of the selected plant (obtained from the 10 best plants as judged by the eye).*			
	Average.		Product of cols.	Weight of 100 average grains in grains.		Average No. of spikelets per earhead.	No. of culms (*i.e.*, tillers).	Product of cols 7 and 8.	Weight of 100 average grains in grains.
	No. of spikelets per earhead	No. of culms (*i.e.*, tillers per plants.							
1	2	3	4	5	6	7	8	9	10
23					5·6				
24	24·7	7·4	182·8	52·4	2·4	24·8	8	198·4	56
25					3·3				
26	25·0	10	250·0	60·6	3·7	25·0	13	325	61
27					3·7				
28	24·7	6	148·2	52·2	3·0	26·4	6	158·4	60
29					3·9				
30	24·6	7·6	187·0	58·2	3·7	25·6	9	230·4	59
31					3·7				
32	23·2	7·4	171·7	53·8	2·3	24·4	9	219·6	62
33					7·2				
34	25·0	10·1	252·5	58·1	5·0	25·16	12	301·92	61
35					3·3				
36	25·6	10·6	271·4	59·8	3·5	26·6	11	292·6	64
37					6·9				
38	25·4	8·4	213·36	59·6	5·0	27·0	11	297	61
39					4·1				
40	25·0	9·2	230·0	56·9	5·4	26·6	10	266	59·5
41					4·8				
42	24·76	7·2	178·3	62·1	3·2	26·75	8	214	62
43					5·3				
44	25·0	7·8	195·0	64·86	4·4	25·5	10	255	66
45					3·9				

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* In the year under report these data were obtained from the 5 best plants as judged by the eye.

APPENDIX X—*contd.*

STATEMENT RECORDING THE RESULTS OF SELECTION FOR SPIKELETS—*contd.*

(*b*) *Popatia*—contd.

Row No.	Details of the whole row as ascertained from 10 plants taken at random.				Actual yield in oz.	Details of the selected plant (obtained from the 10 best plants as judged by the eye).*			
	Average.								
	No. of spikelets per earhead.	No. of culms (*i.e.*, tillers) per plant.	Product of cols. 2 and 3.	Weight of 100 average grains in grains.		average No. of spikelets per earhead.	No. of culms (*i.e.*, tillers.)	Product of cols. 7 and 8.	Weight of 100 average grains in grains.
1	2	3	4	5	6	7	8	9	10
46	24·92	6·8	169·5	58·2	4·9	25·86	7	181·02	60·8
47					4·9				
48	24·9	8·4	209·16	59·8	3·9	26·3	11	289·3	60·5
49					4·9				
50	25·2	7·6	191·5	58·4	3·5	25·8	10	258	59
51					4·6				
52	25·73	9·0	231·57	58·8	4·6	25·9	10	259	60
53					6·4				
54	25·31	6·8	172·1	64·9	3·4	25·4	8	204	65·5
55					2·8				
56	24·5	8·4	205·8	59	4·5	25·9	10	259	61
57					4·3				
58	24·56	6·4	157·2	61	4·4	27·0	6	162	62
59					5·0				
60	24·87	8·0	198·96	59·6	3·8	25·3	8	202·4	64
61					5·3				
62	25·86	8·6	222·4	57·9	4·3	26·54	13	345·02	59·5
63					5·5				
64	25·83	9·0	232·47	66·2	6·1	26·54	9	238·86	66·2
65					1·9				
66	25·15	9·8	246·5	65·2	5·7	25·7	14	359·8	6 6
67					4·0				

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* In the year under report these data were obtained from the 5 best plants as judged by the eye.

APPENDIX X—*concld.*

STATEMENT RECORDING THE RESULTS OF SELECTION FOR SPIKELETS—*concld.*

(*b*) *Popatia*—concld.

Row No.	Details of the whole row (as ascertained from 10 plants taken at random).				Actual yield in oz.	Details of the selected plant (obtained from the 10 best plants as judged by the eye).*			
	Average.		Product of columns 2 and 3.	Weight of of 100 average grains in grains.		Average No. of spikelets per ear-head.	No. of culms (*i.e.*, tillers.)	Product of columns 7 and 8.	Weight of 100 average grains in grains.
	No. of spikelets per ear-head.	No. of culms (*i.e.* tillers) per plant.							
	2	3	4	5	6	7	8	9	10
68	25·44	9·6	244·2	50·0	4·1	26·14	14	365·96	60
69					2·4				
70	25·18	12·4	312·2	60·5	5·6	26·16	18	470·88	61
71					3·4				
72	Plant	substi-	tuted	by	1·5	25·23	13	327·99	64

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* In the year under report these data were obtained from the 5 best plants as judged by the eye.

APPENDIX XI.

STATEMENT RECORDING THE RESULTS OF SELECTION FOR TILLERING IN.

(a) *Dhola wheat.*

Row No.	Details of the whole row (as ascertained from 10 plants taken at random).				Actual yield in oz.	Details of the selected plant (obtained from the 10 best plants as judged by the eye).*			
	Average		Product of columns 2 and 3.	Weight of 100 average grains in grains.		No. of culms (*i.e.*, tillers).	Average No. of spikelets per ear-head.	Product of columns 7 and 8.	Weight of 100 average grains in grains.
	No. of culms (*i.e.* tillers) per plant.	No. of spikelets per ear-head.							
1	2	3	4	5	6	7	8	9	10
1					2·2				
2	12·2	16·7	203·7	61	2·85	13	17·6	228·8	68
3					4·4				
4	10·0	17·3	173·0	44·6	1·9	10	17·7	177·0	60
5					2·9				
6	11·0	17·55	193·05	61·6	3·9	18	17·77	319·86	69
7					2·4				
8	8·4	16·4	137·76	49·4	1·5	11	16·5	181·5	68
9					2·5				
10	6·4	15·4	98·56	54·0	0·9	7	15·4	107·8	72
11					1·2				
12	8·0	15·49	123·92	56·4	1·5	14	16·54	231·56	60
13					1·8				
14	8·2	15·04	123·33	68·9	1·6	12	16·8	201·6	72
15					1·2				
16	7·4	14·94	110·56	44·0	0·5	10	14·9	149·0	56
17					1·7				
18	8·8	15·58	137·1	53·8	1·0	10	16·30	163·0	64

* In the year under report these data were obtained from the 5 best plants as judged by the eye.

APPENDIX XI—*contd.*

STATEMENT RECORDING THE RESULTS OF SELECTION FOR TILLERING IN—*contd.*

(*b*) *Popatia.*

Row No.	Details of the whole row (as ascertained from 10 plants taken at random).				Actual yield in oz.	Details of the selected plant (obtained from the 10 best plants as judged by the eye).*			
	Average.		Product of columns 2 and 3.	Weight of 100 average grains in grains.		No. of culms (*i.e.*, tillers).	Average No. of spikelets per ear-head.	Product of columns 7 and 8,	Weight of 100 average grains in grains.
	No. of culms (*i.e.* tillers) per plant.	No. of spikelets per ear-head.							
1	2	3	4	5	6	7	8	9	10
1					3·7				
2	9·0	26·27	236·43	52·2	2·6	13	27·0	351	60
3					2·3				
4	7·8	24·97	194·77	53·8	3·7	11	25·2	277·2	58
5					3·5				
6	8·8	26·0	228·8	52·7	3·9	11	26·82	295·02	56·7
7					3·0				
8	8·0	25·69	205·52	57·6	3·4	9	26·62	239·58	63
9					3·2				
10	8·2	23·6	193·5	54·9	3·8	8	24·38	195·04	68·5
11					3·6				
12	9·6	24·30	233·3	51·4	3·7	10	24·89	248·9	56
13					3·0				
14	7·0	21·14	148·68	63·2	3·0	8	21·62	172·96	64
15					4·4				
16	10	23·47	234·7	60·2	3·9	14	23·73	332·22	63
17					3·9				
18	8·8	20·49	180·3	59·6	3·4	12	21·25	255·0	65
19					3·0				
20	10·6	23·81	252·4	58·0	3·6	11	24·50	269·5	60

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* In the year under report these data were obtained from the 5 best plants as judged by the eye.

APPENDIX XI—*contd.*

STATEMENT RECORDING THE RESULTS OF SELECTION FOR TILLERING IN—*contd.*

(*b*) *Popatia.*—contd.

Row No.	Details of the whole row (as ascertained from 10 plants taken at random).				Actual yield in oz.	Details of the selected plant (obtained from the 10 best plants as judged by the eye).*			
	Average.		Product of columns 2 and 3.	Weight of 100 average grains in grains.		No. of culms (*i.e.*, tillers).	Average No. of spikelets per ear-head.	Product of columns 7 and 8.	Weight of 100 average grains in grains.
	No. of culms (*i.e.*, tillers) per plant.	No. of spikelets per ear-head.							
1	2	3	4	5	6	7	8	9	10
21					3·3				
22	8·2	23·45	192·3	47·3	1·9	9	23·67	213·03	62·5
23					1·6				
24	Plant substituted by				0·8	14	23·61	330·54	70
25					5·6				
26	8·8	24·95	219·56	59·7	5·0	12	25·91	310·92	60·5
27					3·7				
28	10·8	23·04	248·8	50·0	3·6	13	23·84	309·92	60
29					4·0				
30	8·2	24·57	201·5	60·2	3·6	10	25·5	255	61
31					1·4				
32	11·4	23·39	266·6	60·8	4·4	16	23·94	383·04	71
33					4·6				
34	7·0	25·95	181·65	62·1	2·4	10	26·0	260·0	65.5
35					1·3				
36	8·4	25·15	211·3	49·8	3·7	11	26·18	287·98	61
37					2·0				
38	9·0	25·88	232·9	48·0	4·3	9	27·22	244·98	50
39					2·9				
40	8·0	26·07	208·56	47·6	3·0	10	26·21	262·2	56

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* In the year under report these data were obtained from the 5 best plants as judged by the eye.

APPENDIX XI—*contd.*

STATEMENT RECORDING THE RESULTS OF SELECTION FOR TILLERING IN—*contd.*

(*b*) *Popatia*—contd.

Row No.	Details of the whole row (as ascertained from 10 plants taken at random.				Actual yield in oz.	Details of the selected plant (obtained from the 10 best plants as judged by the eye).*			
	Average.		Product of columns 2 and 3.	Weight of 100 average grains in grains.		No. of culms (i.e., tillers.)	Average No. of spikelets per ear-head.	Product of columns 7 and 8.	Weight of 100 average grains in grains.
	No. of culms (i.e., tillers per plant.	No. of spikelets per ear-head.							
1	2	3	4	5	6	7	6	9	10
41					2·3				
42	Plant substituted by				2·3	13	22·67	294·71	60
43					2·6				
44	9·2	23·02	211·8	46·2	2·4	11	24·18	265·98	50
45					1·6				
46	9·8	25·08	245·8	47·6	4·2	10	26·6	266·0	51
47					3·2				
48	8·6	24·13	127·5	47·6	3·4	10	24·6	246·0	48
49					3·3				
50	12·2	22·79	278·0	51·2	2·7	15	22·73	340·95	64
51					2·9				
52	10·4	24·37	253·5	61·0	6·0	13	25·54	332·02	68
53					5·0				
54	10·2	22·56	230·0	57·2	3·8	13	23·4	304·98	60
55					3·3				
56	10·6	23·5	249·1	54·6	4·0	14	24·77	346·78	60
57					4·2				
58	9·4	21·90	205·9	51·8	3·8	10	21·9	219·0	52
59					3·9				
60	10·2	22·02	224·6	53·0	4·2	14	22·43	314·02	54
61					3·0				
62	8·2	23·93	196·2	57·8	2·9	9	24·69	222·21	60

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* In the year under report these data were obtained from the 5 best plants as judged by he eye.

APPENDIX XI—*contd.*

STATEMENT RECORDING THE RESULTS OF SELECTION IN TILLERING IN—*contd.*

(*b*) *Popatia*—contd.

Row No.	Details of the whole row (as ascertained from 10 plants taken at random).				Actual yield in oz.	Details of the selected plant (obtained from the 10 best plants as judged by the eye).*			
	Average.								
	No. of culms (*i.e.* tillers per plant.	No. of spikelets per ear-head.	Product of columns 2 and 3.	Weight of 100 average grains in grains.		No. of culms (*i.e.*, tillers).	Average No. of spikelets per ear-head.	Product of columns 7 and 8.	Weight of 100 average grains in grains.
1	2	3	4	5	6	7	8	9	10
63					2·6				
64	8·2	22·53	184·7	55.9	3·0	11	23·18	254·98	59
65					2·8				
66	9·2	22·91	210·8	58·0	1·3	9	24·67	222·03	60
67					1·0				
68	10·6	21·79	231	57·0	2·7	13	22·31	290·03	60
69					2·2				
70	Plant substituted by				0·8	10	22·0	220·0	60
71					2·9				
72	7·8	23·95	186·8	53·6	2·0	9	26·33	236·97	63
73					2·4				
74	10·4	25·11	261·1	51·4	3·6	18	26·05	468·90	60

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* In the year under report these data were obtained from the 5 best plants as judged by the eye.

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APPENDIX XI—*concld.*

STATEMENT RECORDING THE RESULTS OF SELECTION FOR TILLERING IN—*concld.*

(*b*) *Popatia*—concld.

Row No.	Detailes of the whole row (as ascertained from 10 plants taken at random).				Actual yield in oz.	Details of the selected plant (obtained from the 10 best plants as judged by the eye.)*			
	Average.								
	No. of columns (*i.e.* tillers) per plant.	No. of spikelets per earhead.	Product of cols. 2 and 3.	Weight of 100 average grains in grains.		No. of columns (*i. e.*, tillers.)	Average No. of spikelets per earhead.	Product of cols. 7 and 8.	Weight of 100 average grains in grains.
1	2	3	4	5	6	7	8	9	10
75					2·5				
76	8·8	24·56	216·1	58·0	2·7	11	26·18	287·98	72
77					3·0				
78	6·8	25·63	174·3	52·6	2·5	9	26·67	240·03	60
79					1·3				
80	6·6	25·55	168·6	50·0	2·5	8	26·0	208·0	59
81					1·4				
82	11·0	24·92	274·12	52·4	3·5	19	26·03	494·57	67
83					1·5				
84	9·0	25·53	227·77	53·8	2·1	10	25·8	258·0	70
85					1·9				
86	9·4	25·02	235·2	49·2	2·5	11	26·27	288·97	60
87					3·6				
88	5·8	24·56	142·5	41·6	1·4	9	25·11	225·99	50
89					2·6				
90	10·0	25·6	256·0	50·4	2·6	12	26·5	318·0	66
91					2·5				
92	10·0	23·34	233·4	56·8	2·3	11	25·18	276·98	61

*In the year under report these data were obtained from the 5 best plants as judged by the eye.

NOTE.—The selections (76 to 92) were originally commenced in the year 1912-13 by Mr· Nagarsheth.

APPENDIX XII.

Statement Showing the Yield of Potatoes Referred to in Para. 56 of the Report.

Plot No.		Manurial Treatment.		Outturn of potatoes per acre in lbs.		
Original.	Duplicate.	Kind.	Quantity per acre in lbs.	Original plots.	Duplicate plots.	Average.
52 A	60 A	G. M. of San + K_2SO_4 + Super-phosphate.	19,800 100 + 200	4528	4944	4736
52 B	60 B	F. Y. M.	20,000	3616	4104	3860

APPENDIX XIII.

Analyses of Leaf of Tobacco varieties Grown on the Farm during 1914-15.

Name of variety.	Chlorine.	Potash.
White Barely	2·52	1·59
Pusa-28	2·70	2·02
Yellow Prior	1·80	0·93
White stem Oronoco	1·98	1·05
Conqueror	1·62	0·70
Kentucky Yellow	3·24	0·66
Yellow Mammoth	2·70	0·81
Bengal Ayasoloak	2·70	0·66
White Barely, U. S. A.	3·06	2·95
Yellow Prior ,,	3·06	1·90
Kentucky Yellow ,,	3.60	2·40
Hestor ,,	3·06	1·98

APPENDIX XIV.

Statement Showing the Analysis of the Guvar varieties Grown on the Nadiad Farm.

Name of the Guvar Variety.	Sotia Local.	Sotia Surat.	Rosi.	Par deshi.	Makhania.
	per cent.	per cent.	per cent.	per cent.	per cent.
Moisture	10	10	10	10	10
Ether extract	3·34	4·34	4·17	4·07	3·42
	37·00	30·12	32·13	35·46	28·44
*Albuminoids	*32·75* 37·23	*23·75* 42·42	*27·13* 39·59	*31·13* 38·12	*22·25* 44·96
Digestible carbohydrates					
Woody fibre	8·19	8·13	9·25	6·84	8·45
Ash	4·25	4·94	4·87	6·33	4·73
Containing Sand	0·40	0·30	0·75	1·70	0·70
*Containing Nitrogen	5·94 *5·24*	4·81 *3·80*	5·26 *4·35*	5·54 *4·98*	4·55 *3·56*
Nutrient, Ratio taking, fat equivalent at 2-3	1 : 0·82	1 : 0·57	1 : 0·65	1 : 0·74	1 : 0·54

* The figures in Italics refer to 1913–14 Samples.

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